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SELECTED WATER RESOURCES ABSTRACTS

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VOLUME 7, NUMBER 17
SEPTEMBER 1, 1974

W74-08701 – W74-09250

SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

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VOLUME 7, NUMBER 17
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The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
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06 WATER RESOURCES PLANNING
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07 RESOURCES DATA
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08 ENGINEERING WORKS
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09 MANPOWER, GRANTS, AND FACILITIES
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SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

FORECASTING CHANGES IN WATER BALANCE UNDER INFLUENCE OF HUMAN ACTIVITY (PROGNOZIROVANIYE IZMENENIY VODNOGO BALANSA POD VLIYANIYEM KHOZYAYSTVENNOY DEYATEL'NOSTI),
For primary bibliographic entry see Field 4A.
W74-08709

HYDROGEOLOGY IS MORE THAN A CLASSICAL SCIENCE,
Wisconsin Univ., Madison. Water Resources Management Program.
D. Stephenson.
Ground Water, Vol 12, No 3, p 148-151, May-June 1974. 1 tab, 3 ref.

Descriptors: *Hydrogeology, *Education, Environment, Management, Planning, Social aspects, Colleges, Universities, Water resources.

Uses of land and water resources create conflicts between natural and human environments. These conflicts are generally not dicusssed as part of a classical approach to geologic education. The need to increase non-earth science training simultaneous with traditional training is discussed. The benefits to be gained will be welcomed by both students and their potential employers. An interdisciplinary, project-oriented course was developed at the University of Wisconsin (Madison Campus) which encompasses both theory and practice in application of hydrogeologic concepts. Case-history presentations are used to supplement basic studies in water-, soil-, rock-, and people-interrelationships--with emphasis on groundwater. (Knapp-USGS)
W74-09090

PROBLEMS OF THE REGIME AND INVESTIGATION OF LAKES AND RESERVOIRS (VOPROSY REZHIMA I ISSLEDOVANIYA OZER I VODOKHRANILISHCH),
Gosudarstvennyi Gidrologicheskii Institut, Lenigrad (USSR).
For primary bibliographic entry see Field 2H.
W74-09100

WATER BALANCE OF LAKE BAYKAL (VODNYY BALANS OZ. BAYKAL),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2H.
W74-09101

VOLUME OF WATER IN RIVERS, LAKES, AND RESERVOIRS OF THE SOVIET UNION (OB"YEM VODY V REKAKH, OZERAKH I VODOKHRANILISHCHAKH SOVETSKOGO SOYUZA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2H.
W74-09111

WATER BALANCE OF WORLD LAKES AND RESERVOIRS (VODNYY BALANS OZER I VODOKHRANILISHCH ZEMNOGO SHARA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2H.
W74-09112

SEISMIC REFRACTION ANALYSIS OF WATERSHED MANTLE RELATED TO SOIL, GEOLOGY, AND HYDROLOGY,
Forest Service (USDA), Rapid City, S. Dak. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 2G.
W74-09199

PARTIAL AREA HYDROLOGY AND ITS APPLICATION TO WATER RESOURCES,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
E. T. Engman.
Water Resources Bulletin, Vol 10, No 3, p 512-521, June 1974. 4 fig, 22 ref.

Descriptors: *Rainfall-runoff relationships, *Hydrograph analysis, Urban hydrology, Land use, Storm runoff, Infiltration, Hydrogeology, Soil water, Model studies, Remote sensing, Water quality.
Identifiers: Partial area hydrology.

Using a concept known as partial area hydrology, watershed areas are separated into hydrologically active and passive subareas. The literature relating to the development of the partial area concept is reviewed briefly and the relationship of partial area hydrology to geology, soils, and micrometerology is illustrated. The potential application of partial area hydrology is discussed with respect to present hydrologic techniques, future hydrologic models, urban hydrology, water quality, and water management. Certain regions within a watershed contribute runoff to the storm hydrograph while other areas act as recharge or storage zones. Whether an area contributes to runoff or to the groundwater depends on its physical position with respect to the channel, its soil properties, and the storm characteristics. Soil maps and air photos offer the best tools for identifying and delineating the partial areas in a watershed. On air photos, dark tones indicating poor drainage and light tones indicating erosion could indicate contributing areas. Other forms of remote sensing offer a lot of potential for the future identification of partially contributing areas. The most promising of these is radar imagery. (Knapp-USGS)
W74-09200

A SENSITIVITY AND ERROR ANALYSIS OF PROCEDURES USED FOR ESTIMATING EVAPORATION,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2D.
W74-09201

EFFECT OF URBANIZATION ON RUNOFF FROM SMALL WATERSHEDS,
Arizona Univ., Tucson. Water Resources Research Center.
For primary bibliographic entry see Field 4C.
W74-09245

2B. Precipitation

A NOTE ON THE REMARKABLY LOW RAINFALL OF THE SUDAN ZONE IN 1913,
Cambridge Univ. (England). Dept. of Geography.
A. T. Grove.
Savanna, Vol 2, No 2, p 133-138, December 1973. 2 fig, 23 ref.

Descriptors: *Isohyets, *Droughts, *Africa, *Climatic data, *Dry seasons, Rainfall, Livestock, Rivers, Lakes, Flood discharge, Water levels Regional analysis.
Identifiers: Sudan zone, Inter-tropical discontinuity, Nile River, Senegal, Ethiopia.

The Sudan zone is a latitudinal belt running across Africa from Senegal to Ethiopia having a mean annual rainfall ranging between 16 and 40 inches. A dry period occurs from October to April with most of the rain coming during the summer months. The years between the turn of the century and World War I were considerably drier than periods before or after and despite scanty rainfall records, 1913 appeared to be particularly dry year. During this year many areas received from 20 to 50 percent of their mean annual rainfall with ranges of 5 to 30 inches within the zone. From available data the concluded cause of the drought period was a shift of isohyets 150 km. or more to the south of their mean positions bringing about an influence of the desert climate. (Mastic-Arizona)
W74-08759

A JEEP-MOUNTED RAINFALL SIMULATING INFILTROMETER,
Northern Arizona Univ., Flagstaff.
For primary bibliographic entry see Field 7B.
W74-08766

PREDICTION OF DEW POINT TEMPERATURE, SOLAR RADIATION AND WIND MOVEMENT DATA FOR SIMULATION AND OPERATIONS RESEARCH MODELS,
Hydrocomp, Inc., Palo Alto, Calif.
D. Franz.
Available from the National Technical Information Service as PB-232 987: $6.00 in paper copy, *1.45 in microfiche. Completion Report, April 1974. 53 p, 7 tab, 11 ref. OWRR C-3266(3736)(1).

Descriptors: *Dew point, *Solar radiation, *Wind speed, Meteorology, Humidity, Energy balance, Regression analysis, *Air temperature, Simulation analysis, Model studies, Operations research, United States, *Forecasting, Water temperature.

Predictive relationships for mean daily dew point temperature, daily total shortwave solar radiation, and daily wind movement using daily maximum and minimum air temperature as the predictor variable were derived for approximately 23 stations in the United States. A simple linear regression of dew point on minimum temperature proved to be best for the dew point prediction. The fit was best in the humid regions in the winter and poorest in the summer in the arid and semi-arid regions. Percent of possible solar radiation was regressed on the daily range in temperature for the solar radiation relationship. The fit obtained was poorer than the fit for dew point. The coefficient of correlation for the dew point relationships was most frequently in the range of 0.7 to 0.95 while for solar radiation the range was generally for 0.5 to 0.8. The standard error of estimate for dew point ranged from 2.0 to 10.0 degrees Fahrenheit with most values in a narrower range from 4.0 to 6.0 degrees. The standard error for solar radiation was most frequently in the range of 10 to 25 percent.
W74-08933

LABORATORY SIMULATION OF RAINFALL EROSIVITY FOR GULLY FORMATION STUDY,
Kentucky Univ., Lexington. Water Resources Research Inst.
For primary bibliographic entry see Field 2J.
W74-08937

ACID RAIN: A SERIOUS REGIONAL ENVIRONMENTAL PROBLEM,
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
For primary bibliographic entry see Field 5B.
W74-09098

REFINEMENT OF THE PRECIPITATION AMOUNT AS APPLIED TO CALCULATION OF

WATER BALANCE OF LAKE BAYKAL, (UTOCHNENIYE VELICHINY OSADKOV PRIMENITEL'NO K RASCHETU VODNOGO BALANSA OZ. BAYKAL),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2H.
W74-09102

THE POSSIBILITIES OF THE IDENTIFICATION OF PRECIPITATION ZONES WITH MISZ (METEOROLOGICAL ARTIFICIAL EARTH SATELLITES),
A. G. Gorelik, V. V. Kalashnikov, and Yu. A. Frolov.
Available from NTIS, Springfield, Va. 22151, as AD-766 035 Price $3.00 printed copy; $1.45 microfiche. Air Force Foreign Technology Division Translation Report FTD-MT-24-699-73, August 1973. 14 p, 4 fig, 2 tab, 11 ref. (Translated from Trudy Tsentral'noy Aerologicheskoy Observatorii. Sputnikovaya Meteorologiya, No 103, p 31-41, 1972.).

Descriptors: *Remote sensing, *Satellites(Artificial), *Precipitation(Atmospheric), Solar radiation, Surveys, Synoptic analysis, Data collections.

Precipitation zones may be sensed from the earth and from meteorological artificial Earth satellites with the aid of passive radar equipment. Radio brightness contrasts of the different types of clouds are determined by the form of the underlying surface against the background of which radiometric measurements are conducted. For all wavelengths the contrasts are increased with an increase in the reflection coefficient of the underlying surface. (Knapp-USGS)
W74-09196

2C. Snow, Ice, and Frost

EFFECTS OF ICE FORMATION ON THE SALT REGIME OF A RESERVOIR (VLIYANIYE LEDOOBRAZOVANIYA NA SOLEVOY REZHIM VODOKHRANILISHCHA),
Vsesoyuznyi Nauchno-Issledovatel skii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenerno Gidrogeologii, Moscow (USSR).
V. A. Baranov, and I. A. Bystrov.
Vodnyye Resursy, No 4, p 188-192, 1973. 1 fig, 4 tab, 6 ref.

Descriptors: *Ice, *Reservoirs, *Water chemistry, *Salt balance, *Salts, Ions, Chemical precipitation, Water balance.
Identifiers: *Ukrains, *USSR(Donets Basin), Mineralization.

During ice formation, precipitation of salts from water of reservoirs in the Donets Basin in the Eastern Ukraine occurs in direct proportion to thickness of ice cover. For the Staro-Krymskoye Reservoir, the quantity of salts precipitated in 1958-65 during periods of complete ice cover was 2%-5% of their total content in the reservoir. To forecast dissolved-salts content of reservoir water, special laboratory experiments are needed to study precipitation of salts during formation of ice. (Josefson-USGS)
W74-08704

THE RELEASE OF WATER FROM FOREST SNOWPACKS DURING WINTER,
Forest Service (USDA), Ogden, Utah. Intermountain Forest and Range Experiment Station.
H. F. Haupt.
USDA Forest Service Research Paper INT-114, January 1972. 17 p, 7 fig, 4 tab, 9 ref.

Descriptors: *Snowpacks, *Canopy, *Lysimeter, *Throughfall, *Forests, Snowfall, Evaporation, Snowmelt, Water level recorders, Rainfall, Precipitation(Atmospheric), Ablation, Interception, Solar radiation, *Rocky Mountain Region, Topography, Water equivalent, Winter.

Data collected on releases of water in undisturbed forests and small openings on two slope aspects over a three-year period are analyzed. The problem of measuring the outflows from beneath a snowpack directly was solved by the designing of a snow lysimeter. Results of the study showed that mature forest cover and topographic exposure greatly influence the release of snow water to the soil mantle. More water is usually available to recharge the soil mantle in small openings than in forested areas. Through fall-drip from the forest canopy is the major contributor to water release in the forest, and is directly dependent on the interception and detention of snow in the canopy. The volume of outflow from snowpacks is greater beneath the canopy than from small openings. The main difference originates from the intercepted snow by the canopy which is converted to drip which in turn percolates through the snowpack. (Mastic-Arizona)
W74-08761

ICE THRUST ON SHORES OF NORTH GERMAN LAKES AND ITS EFFECT,
K. Laskar, and K. Strenzke.
Available from NTIS, Springfield, Va 22151 as AD-769 728, price $3.00 printed copy; $1.45 microfiche. Army Cold Regions Research and Engineering Laboratory Draft Translation 405, August 1973. 7 p, 7 fig. Translated from Natur und Volk (Nature and Man), No 71, p 63-70, 1941.

Descriptors: *Lakes, *Ice cover, *Iced lakes, *Beaches, Geomorphology, Beach erosion, Scour, Ice loads, Ice jams.
Identifiers: *Ice thrust, Ice pressure, *Germany(Ploner Lake).

Beach ridges may be formed by ice pressure as the result of temperature variations and subsequent volume changes of the ice cover, or by ice thrusting due to wind action. The latter type predominates in Germany. A specific minimum basin area is a prerequisite for large-scale thrust action. Several cases of ice thrust on the Ploner Lake (Germany) are described. The ice blocks pile up parallel over each other along the shore and push inland. (Knapp-USGS)
W74-09219

EVALUATION OF ERTS DATA FOR CERTAIN HYDROLOGICAL USES,
National Environmental Satellite Service, Hillcrest Heights, Md.
D. R. Wiesnet, D. F. McGinnis, and M. Matson.
Available from NTIS, Springfield, Va. 22151 as N73-29220 - Price $3.50 printed copy; $1.45 microfiche. Status and Technical Progress Report, July 1973. 6 fig, 3 tab, 7 ref.

Descriptors: *Ice, *Snow cover, *Mapping, *Remote sensing, Great Lakes, Aerial photography, Snowmelt, Ice cover, Iced lakes.
Identifiers: *ERTS.

Mapping of snow cover using ERTS-1 data was six times faster than usig U-2 photography. Ice conditions in the Great Lakes can readily be determined by ERTS-1. Ice features characteristic of thawing conditions such as rotten ice, lack of pressure ridges, brash belts and compacted ice edges can be identified. A great decrease in apparent reflectivity in band 7 as compared to band 4 also indicates melting conditions. Using sidelap from two successive ERTS-1 images of Lake Erie (February 17 and 18, 1973) a measure of ice movement was made, agreeing closely with the estimate from conventional methods. The same imagery permitted tentative identification of the following features: shuga, light and dark nilas, fast ice, icefoot, ice breccia, brash ice, fracturing, ridging, rafting, sastrugi, thaw holes, rotten ice, ice islands, dried ice puddles, humnocked ice, and leads. (Knapp-USGS)
W74-09230

2D. Evaporation and Transpiration

CONTROLLED ENVIRONMENT STUDIES OF THE EFFECTS OF VARIABLE ATMOSPHERIC WATER STRESS ON PHOTOSYNTHESIS, TRANSPIRATION, AND WATER STATUS OF ZEA MAYS L. AND OTHER SPECIES,
Commonwealth Scientific and Industrial Research Organization, Griffith (Australia). Div. of Irrigation Research.
H. D. Barrs.
In: Plant Response to Climatic Factors UNESCO, 1973, p 249-258, 6 fig, 1 tab, 24 ref.

Descriptors: *Photosynthesis, *Transpiration, *Greenhouses, *Moisture stress, *Corn(Field), Flow resistance, Flow rates, Leaves, Carbon dioxide, Relative humidity, Temperature, Stomata, Root systems, Rhizosphere.
Identifiers: Ohm's law, Water potential.

The movement of water through some selected plant species was investigated. This study contradicted the assumption that resistance to flow of water from the roots through the stems to evaporation sites in the leaves is constant, which is analogous to an Ohm's law type of relationship. Studies conducted on a maize plant showed that resistance declined progressively as the transpiration rate increased in response to a lowered relative humidity and a constant temperature. There was considerable variation in behavior among species and no overall pattern analogous to an Ohm's law relationship was exhibited. A feature common to all species studied was a decline in resistance to flow as flow rate increased, although the importance and extent varied among species. Also the net photosynthetic rate was not reduced as relative humidity was lowered for all species. (Mastic-Arizona)
W74-08754

COTTON LEAF TEMPERATURES AS RELATED TO SOIL WATER DEPLETION AND METEOROLOGICAL FACTORS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 3F.
W74-08755

AIR TEMPERATURE AND VAPOR PRESSURE CHANGES CAUSED BY SPINKLER IRRIGATION,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
For primary bibliographic entry see Field 3F.
W74-08757

MEASUREMENT OF EVAPOTRANSPIRATION IN THE PRESENCE OF ADVECTION, BY MEANS OF A MODIFIED ENERGY BALANCE PROCEDURE,
Commonwealth Scientific and Industrial Research Organization, Griffith (Australia). Div. of Irrigation Research.
A. R. G. Lang.
Agricultural Meteorology, Vol 12, p 75-81, 1973. 3 tab, 15 ref.

Descriptors: *Evapotranspiration, *Advection, *Energy equation, *Heat flow, *Energy gradients, Wind velocity, Temperature, Humidity, Height.
Identifiers: Bowen ratio, Energy balance, Horizontal gradients, Vertical gradients, Philip's theory.

Large errors in evapotranspiration measures can be caused by local advection. These errors can be

calculated by an energy balance equation solved in terms of the Bowen ratio measured at a single height above the surface. This analysis was consistent with previous data confirming that a single height for measuring horizontal gradients of temperature and humidity can be used to obtain reliable data on evapotranspiration. Reliable measurements of evapotranspiration in the presence of large advective fluxes can be made using energy balance methods at a height of about 1 meter according to the described procedures. Further research is necessary to determine the general usefulness of the procedures, particularly for estimating horizontal gradients using a single height for measurements. (Mastic-Arizona)
W74-08760

PLANT WATER STATUS IN RELATION TO CLOUDS,
Georgia Coastal Plain Experiment Station, Tifton.
J. R. Stansell, B. Klepper, V. D. Browning, and H. M. Taylor.
Agronomy Journal, Vol 65, No 4, p 677-678, July-August, 1973. 2 fig, 2 ref.

Descriptors: *Evapotranspiration, *Soil moisture, Plant tissues, Cloud cover, *Clouds.

Clouds can cause significant changes in plant water status in a short time. Therefore, care should be taken to sample different treatments under comparable radiation. (Skogerboe-Colorado State)
W74-08801

PREDICTION OF DEW POINT TEMPERATURE, SOLAR RADIATION AND WIND MOVEMENT DATA FOR SIMULATION AND OPERATIONS RESEARCH MODELS,
Hydrocomp, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 2B.
W74-08933

DIGITAL-COMPUTER PROGRAMS FOR ANALYSIS OF GROUND-WATER FLOW,
Geological Survey, Little Rock, Ark.
For primary bibliographic entry see Field 2F.
W74-09115

A SENSITIVITY AND ERROR ANALYSIS OF PROCEDURES USED FOR ESTIMATING EVAPORATION,
Maryland Univ., College Park. Dept. of Civil Engineering.
R. H. McCuen.
Water Resources Bulletin, Vol 10, No 3, p 486-497, June 1974. 3 tab, 11 ref.

Descriptors: *Evaporation, Mathematical studies, Equations, Meteorology, Variability, Heat transfer, Heat budget, Winds, Model studies.
Identifiers: *Error analysis, *Sensitivity analysis.

The structure of commonly used evaporation models, the effect of variation in meteorological factors on observed evaporation rates, and the effect of error in measurements of the meteorological factors were studied by sensitivity and error analyses. Error in evaporation estimates resulting from measurement error in meteorological factors in probably much less than 5% of the computed evaporation rate. The importance of the different meteorological factors varies in time and space. The sensitivity analysis indicates that the Fractional-Evaporation Equivalent method is structurally inadequate and the Weather Bureau model is more flexible than the Penman model. However, the Penman model provides more realistic estimates of the importance of the various meteorological factors. (Knapp-USGS)
W74-09201

WATER LOSS FROM AN IRRIGATED SORGHUM FIELD: II. EVAPOTRANSPIRATION AND ROOT EXTRACTION,
South Dakota State Univ., Brooking. Dept. of Plant Science.
For primary bibliographic entry see Field 3F.
W74-09249

2E. Streamflow and Runoff

DETERMINATION OF GEOMETRIC AND HYDRAULIC CHARACTERISTICS OF A STREAM CHANNEL BY SOLUTION OF INVERSE PROBLEMS FOR SAINT VENANT EQUATIONS (OPREDELENIYE GEOMETRICHESKIKH I GIDRAVLICHESKIKH KHARAKTERISTIK RECHNOGO RUSLA PUTEM RESHENIYA O BRATNYKH ZADACH DLYA URAVNENIY SEN-VENANA),
Gidrometeorologicheskii Nauchno-Issledovatelskii Tsentr, Leningrad(USSR).
V. I. Koren', and L. S. Kuchment.
Vodnyye Resursy, No 4, p 83-100, 1973. 6 fig, 2 tab, 15 ref.

Descriptors: *Hydraulics, *Channels, *Channel flow, *Channel morphology, Roughness(Hydraulic), Mannings equation, Discharge(Water), Floods, Water levels, Optimization.
Identifiers: *USSR, *Saint Venant equations.

Saint Venant equations are the most thoroughly studied model of unsteady channel flow and are widely used to calculate movement of flood waves and reservoir releases. Determining geometric and hydraulic characteristics of a stream channel is based on observations of the water regime. Solution of this problem is unstable, and additional information is needed on properties of the solution and on possible errors in initial data. Algorithms are proposed for solving the problem at varying amounts of initial data, using the theory of incorrect problems and optimization procedures. Algorithms proposed were tested on the basis of data of special observations conducted on the Svir' River in northeastern Leningrad Oblast and on the Tvertsa River in Kalinin Oblast. (Josefson-USGS)
W74-08707

NUMERICAL COMPUTATION OF MOMENTUM JETS AND FORCED PLUMES,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 8B.
W74-08782

A COMPARATIVE ESTIMATE OF ENERGY LOSSES IN WATER BODIES AND IN TRANQUIL AND TURBULENT FLOWS (SRAVNITEL'NAYA OTSENKA POTER' ENERGII V VODOYEMAKH, SPOKOYNYKH I BURNYKH POTOKAKH),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2H.
W74-09109

WATER RESOURCES DATA FOR GEORGIA, 1973.
Geological Survey, Doraville, Ga.
For primary bibliographic entry see Field 7C.
W74-09116

AN INVESTIGATION OF SECONDARY FLOW EFFECTS IN CURVED CHANNELS OF SQUARE CROSS SECTION,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 8B.
W74-09193

SURFACE WATER TEMPERATURES AT SHORE STATIONS, UNITED STATES WEST COAST, 1972.
Scripps Institution of Oceanography, La Jolla, Calif.
Available from NTIS, Springfield, Va. 22151 as AD-768 375 Price $2.75 printed copy; $1.45 microfiche. Data Report (SIO Reference 73-15), May 1973. 20 p, 1 fig. ONR Contract N00014-69-A-0200-6006.

Descriptors: *Water temperature, *Salinity, *Sea water, *Pacific Ocean, Data collections, Hydrologic data, Oceanography, Sampling.

Temperature and salinity data observed during 1972 at shoreline stations along the west coast of North America from the Strait of Juan de Fuca, Washington, to La Jolla, California, are compiled. The data consist of monthly means, ranges, and standard deviations based on daily observations. Temperature readings and water samples are obtained from surf and sandy beaches, off rocky cliffs and ledges, over the sides of lightships, and off piers, depending upon the station location. (Knapp-USGS)
W74-09197

SMALL-STREAM FLOOD INVESTIGATIONS IN ALASKA, A COMPILATION OF PEAK DATA, MAY 1963 TO SEPTEMBER 1972,
Geological Survey, Anchorage, Alaska.
S. H. Jones.
Basic-data report, 1973. 55 p, 8 fig, 3 tab, 5 ref.

Descriptors: *Peak discharges, *Small watersheds, *Alaska, Stage-discharge relations, Floods, Stream gages, Data collections, Hydrologic data.

A small-stream flood investigation program for Alaska was initiated in September 1962. This program was designed to provide flood data on streams with drainage areas generally less than 100 square miles, placing particular emphasis on those with areas of less than 50 square miles. The objective was to obtain sufficient flood data to define the magnitude and frequency of floods on a regional basis for the entire State and provide information for detailed hydrologic studies. Hydrologic data obtained under this program consist primarily of the annual maximum instantaneous stages and discharges. (Knapp-USGS)
W74-09218

THE PINE-POPPLE RIVER BASIN--HYDROLOGY OF A WILD RIVER AREA, NORTHEASTERN WISCONSIN,
Geological Survey, Washington, D.C.
E. Oakes, S. J. Field, and L. P. Seeger.
Available from Sup Doc, GPO, Washington, D C 20402 - Price $3.20 (paper cover). Water Supply Paper 2006, 1973. 57 p, 16 fig, 2 plate, 7 tab, 26 ref.

Descriptors: *Wild rivers, *Wisconsin, Water resources, Water utilization, Recreation, Fishing, Boating, Water supply, Water quality, Data collections, Hydrologic data.
Identifiers: *Pine-Popple river basin(Wisc).

The Pine and Popple Rivers, virtually unaltered by man, flow through a semiprimitive area of forests, lakes, and glacial hills in Wisconsin. White-water streams, natural lakes, fish and animal life, and abundant vegetation contribute to the unique recreational and aesthetic characteristics of the area. The basin covers about 563 square miles in northeastern Wisconsin. Swamps and wetlands cover nearly 110 square miles, and the 70 lakes cover about 11 square miles. The undulating topography is formed by glacial deposits overlying an irregular, resistant surface of bedrock. An annual average of 30 inches of precipitation, highest from late spring to early autumn, falls on the basin. Of this amount, evapotranspiration, highest in mid summer and later summer, averages 19 inches; the

remaining 11 inches is runoff, which is highest in spring and early summer. Groundwater from the glacial drift is the source of water for the minor withdrawal use in the basin. The major uses of water are for recreation and power generation. No water is withdrawn from lakes or streams, and no sewage or industrial wastes are added to lakes or streams. Most of the flow of the Pine River is used for power generation. The main stems of the Pine and Popple Rivers contain 114 canoeable miles, of which 95% is without such major obstructions as falls or large rapids. In general, streams support cold-water fish, and lakes support warm-water fish. The basin has no significant water problems. (Knapp-USGS)
W74-09223

2F. Groundwater

ESTIMATION AND MAPPING OF RATES OF EXCHANGE OF FRESH GROUNDWATER IN THE BALTIC ARTESIAN BASIN (OTSENKA I KARTIROVANIYE TEMPOV VODOOBMENA PRESNYKH PODZEMNYKH VOD (NA PRIMERE PRIBALTIYSKOGO ARTEZIANSKOGO BASSEYNA)),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
I. S. Zektser, and L. B. Koval'skiy.
Vodnyye Resursy, No 4, p 113-123, 1973. 3 fig, 17 ref.

Descriptors: Groundwater, *Groundwater basins, *Artesian aquifers, *Estimating, *Mapping, Groundwater recharge, Groundwater movement, Base flow, Subsurface flow, Hydrogeology.
Identifiers: *USSR(Baltic Sea region), *Water exchange, Isolines.

The Baltic artesian basin, which covers about 214,000 sq km in the USSR, includes Estonia, Latvia, Lithuania, the Kaliningrad Oblast, and northern regions of Belorussia. The southwestern part of the basin is located in Poland. Possibilities of estimating and mapping rates of exchange of fresh groundwater were based on data on subsurface flow. Periods of water exchange within the Sventoji-Tartu aquifer complex range from 250 years to 10,000 years, depending upon specific natural conditions of the region. A comparative estimate was made of different methods of determination of rates of water exchange and of their applicability. (Josefson-USGS)
W74-08705

GROUNDWATER RECHARGE FROM A PORTION OF THE SANTA CATALINA MOUNTAINS,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
R. A. Belan, and W. G. Matlock.
In: Hydrology and Water Resources in Arizona and the Southwest, Proc. of the 1973 meetings of the Arizona Section-AWRA and the Hydrology Section-Arizona Academy of Science, May 4-5, 1973, Tucson, Arizona, p 33-40, 1973. 3 fig, 1 tab, 11 ref.

Descriptors: *Aquifers, *Groundwater recharge, *Groundwater basins, *Geohydrologic units, Groundwater, Infiltration, Precipitation(Atmospheric), Surface runoff, Geology, Faults(Geologic), Arroyos, Joints(Geologic), Alluvial fans, Well data, Hydraulic gradient, Flow nets, Water quality, Transmissivity, Darcy's Law, *Watersheds(Basins), Mountains, *Arizona.

The geohydrology of a portion of the Santa Catalina Mountains including the definition of aquifer systems in the foothills was studied in order to calculate groundwater recharge to the Tucson Basin. This underlying groundwater aquifer is the only source of Tucson, Arizona's water supply. A well network, well logs, geologic profiles, and a water level contour map were used as source information. Recharge was found to occur in some sections of washes and close to the mountains where washes cross or coincide with faults. Significant recharge to sand and gravel aquifers occurs directly through faults and joints. Little of the surface runoff is thought to recharge local aquifers because of low permeability layers beneath the alluvium and the short duration of the flows. Recharge calculation using the Darcy equation was subject to considerable error; but flow net analysis showed the total recharge to be 336 acre-feet per year representing about 50 acre feet per mile of mountain front per year. (Mastic-Arizona)
W74-08764

THE EFFECT OF DATA DENSITY ON GROUNDWATER CONTOURING ACCURACY,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
P. R. Davis, and W. G. Matlock.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 6, p 1112-1116, November-December, 1973. 7 fig, 1 tab, 3 ref.

Descriptors: Investigations, *Groundwater basins, *Contours, *Mapping, *California, *Data collections.

The effect of different data densities on contour maps representing fairly uniform data was investigated. Tests were conducted in California on a groundwater basin of 780 sq miles. The Standard Map for the basin was drawn from 445 randomly located data points which covered an interior area of 411 sq miles. Spacings between input points of 1, 4, and 6 miles were analyzed with three tests each on the 4 and 6 mile spacings. Tests were also made on a 6 mile triangular grid and a semirandom grid obtained by dividing the area into squares 6 miles on a side and then randomly selecting a grid interaction within each square. The number of tests conducted was insufficient to draw any conclusions, but the tests support the belief that the more observations there are, the more accurately the surface will be defined. For investigations where detailed groundwater contour maps are not required, a data density with approximately 4 miles between points is suggested. Additional data points may be added near the fringes if extended control is necessary. (Merritt-FIRL)
W74-08781

NORTHERN ILLINOIS USES STORAGE EFFECTIVELY,
For primary bibliographic entry see Field 4B.
W74-08909

FLOW TOWARD PERIODIC TITLE DRAINS,
Wisconsin Univ., Milwaukee. School of Architecture.
I. Gyuk, A. Soriano, and G. M. Karadi.
Journal of Hydrology, Vol 19, No 2, p 113-129, June, 1973. 9 fig, 3 ref. OWRR A-029-WIS(3).

Descriptors: *Drainage, *Groundwater, *Tile drainage, Subsurface drainage, Drainage practices, Drainage systems, Soil water movement, Drainage engineering, Mapping, Flow.
Identifiers: Conformal mapping.

The method of conformal mapping is applied to the analysis of transient flow toward parallel periodic drains in a semi-infinite aquifer taking into consideration the non-linear boundary conditions on the free surface. The mapping function is expressed as a power series in time and the seepage domain is mapped onto a domain of an auxiliary complex variable. Mapping is performed in such a manner that the free surface will always remain the real axis. Calculations are carried out for different ratios of drain depth to drain spacing using various drain diameter to depth ratios. (Skogerboe-Colorado State)
W74-08923

UNSTEADY FLOW TO BOTTOM DRAIN IN BOUNDED AQUIFER,
Northwestern Univ., Evanston, Ill. Technological Inst.
R. J. Krizek, A. Soriano, and I. Gyuk.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 99, No IR2, p 169-182, June, 1973. 6 fig, 11 ref.

Descriptors: *Groundwater, *Aquifers, *Aquifer characteristics, Drainage, Tile drains, Irrigation, Seepage, Transition flow, *Unsteady flow, Mapping.
Identifiers: Conformal mapping, Complex variables.

The problem of transient seepage toward a drain at the bottom of a homogeneous, isotropic aquifer is presented. The dependent variables are the position of the free surface, the flow rate, and the pore pressure distribution around the drain, and these are determined as functions of time for various depths of drainage and drain sizes; the characteristics of the aquifer are specified in terms of its coefficient of permeability and its effective porosity. The mathematical statement of this problem yields to a time-dependent potential field within a strip domain by the impervious bottom, the moving free surface, and a small semicircular contour representing the drain. To overcome the difficulty of a moving boundary, a conformal mapping technique is used to transform the problem into a new plane in which the free surface remains straight and fixed. The solution of the problem is found to the third order of time, and an upper bound is given to limit the range within which it is valid. (Skogerboe-Colorado State)
W74-08926

GEOTHERMICS.
Available from Maxwell Scientific International, Inc, Fairview Park, Elmsford, NY 10523, Price $60.00 (2 vol). Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 975-1725, 1973.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Conferences, Hydrogeology, Groundwater, Thermal power, Economics, Brines, Mineralogy.
Identifiers: *Geothermal power.

The geothermal resources of the world were discussed at a symposium held at Pisa in 1970. The specific topics discussed include hydrogeology, economics, exploration, borehole geophysics, powerplant design, hydraulics, byproduct heat and chemicals, and powerplants operation. The conference proceedings contain about 200 individual papers. (See W74-08974 thru W74-09048) (Knapp-USGS)
W74-08973

GEOTHERMAL POTENTIAL OF IDAHO,
Idaho Bureau of Mines and Geology, Moscow.
S. H. Ross.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 975-1008, 1973. 13 fig, 2 tab, 68 ref.

Descriptors: *Thermal water, *Geothermal studies, *Idaho, Thermal springs, Hot springs, Hydrothermal studies, Mineral water, Thermal power.
Identifiers: *Geothermal power.

The first comprehensive inventory and evaluation of thermal groundwater in the State of Idaho since 1925 shows that such water can be expected in wells and springs almost anywhere along the margins of the Snake River Plain or in valleys south of the Plain. In addition, about one-half of the ap-

proximately 200 thermal springs in the state emerge from granitic rocks or silicic volcanic rocks along the borders of the Idaho batholith. Although no stream has been observed, water in a few wells is boiling, and temperatures of many springs are only slightly lower. Sodium and bicarbonate are the dominate ions in most waters, although a few highly mineralized springs are the sodium-chloride type. Specific electrical conductance of thermal waters from granitic rocks averages between 300 and 400 micromhos/cm at 25 deg C; average conductivity of thermal water from volcanic rocks is somewhat higher. Much of the water usually high in silica and fluoride, even though concentrations of other minerals are low. (See also W74-08973) (Knapp-USGS)
W74-08974

GEOTHERMAL PROSPECTS IN NEW MEXICO,
New Mexico Bureau of Mines and Mineral Resources, Socorro.
W. K. Summers.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1009-1014, 1973. 3 fig, 2 tab, 6 ref.

Descriptors: *Thermal water, *Geothermal studies, *New Mexico, Thermal springs, Hot springs, Hydrothermal studies, Mineral water, Thermal power.
Identifiers: *Geothermal power.

Fifty-seven areas in New Mexico discharge groundwater at a temperature of 90 deg F or higher. Thermal waters occur in the western half of the state, primarily in the Rio Grande and Gila-San Francisco drainage basins. Only 16 areas have been discovered by wells, whereas 30 areas are marked by springs. The water issues from rocks ranging from Precambrian to Cenozoic age with the Cenozoic rocks predominating. The waters are associated with igneous and sedimentary rocks in about equal proportions. The water occurs primarily in areas of extensive volcanism and secondarily in fault zones. The water discharges from springs near streams but mostly at points well above the river levels. The discharge may be from fractures directly from beneath a talus cover, from alluvium, or from some combinations of these. (One spring discharges from a tufa mound). The median pH is 7.7, the median maximum temperatures is about 105 deg F, the median discharge of springs is 30.5 gpm, and the median concentration of sodium is 167 ppm, of magnesium 6.9 ppm, of calcium 37.6, of lithium 0.30 ppm, and of potassium 10.0 ppm. The most promising prospects for natural stream in New Mexico are the Animas Valley in Hidalgo County, the Cliff-Gila-Riverside area in Grant County, the southern Rio Grande trough, and the Upper Jemez River Basin. (See also W74-08973) (Knapp-USGS)
W74-08975

GEOTHERMAL RESOURCES OF GUATEMALA, CENTRAL AMERICA,
Instituto Nacional de Electrificacion (Guatemala).
R. Fernandez-Rivas.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1015-1025, 1973. 5 fig, 4 tab, 34 ref.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *Guatemala.

Guatemala offers possibilities for the exploitation of geothermal energy as there are some thermal evidences near Amatitlan Lake, Zunil, Aguas Amargas, and Aguas Georginas. A map shows the thermal regions of Amatitlan. A list of the principal known volcanoes is given. (See also W74-08973) (Knapp-USGS)
W74-08976

GEOTHERMAL RESOURCES OF COSTA RICA.
Servicio Nacional de Electricidad, San Jose (Costa Rica).
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1026-1029, 1973. 2 tab.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *Costa Rica.

A short description of the development of electric energy in Costa Rica is given. Numerous areas exhibit geothermal manifestations, but studies conducted in this field are scanty. These areas are generally associated with Quaternary volcanic systems. The most promising springs are found in Las Hornillas on the southern side of the Miravalles volcano, and Las Pailas on the southern side of the Rincon de la Vieja volcano. (See also W74-08973) (Knapp-USGS)
W74-08977

THERMAL AND MINERAL SPRINGS IN UGANDA,
Uganda Geological Survey and Mines Dept., Entebbe.
C. G. Dixon, and W. H. Morton.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1035-1038, 1973. 3 tab, 8 ref.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *Uganda.

The geothermal power potential in Uganda and the thermal springs are described. The temperatures of the springs vary from quite cool to boiling. The salinity of the mineral springs of Uganda varies greatly from one to another, both as regards the quantity and the chemical composition of the dissolved solids. The salinity of individual springs is known to have changed in the course of time. For instance, the water of Kibiro had 5.98 grams of dissolved solids per liter in the year 1920, 10.92 in 1921, and 22.28 in 1935. Most of the thermal and mineral springs of Uganda are in or near the Western Rift Valley and its associated volcanic centers, while five are in the eastern part of the country not far from the Eastern Rift Valley of Kenya. During 1954 three boreholes were drilled at Durange in order to investigate the possibility of locating supplies of geothermal steam. In No. 1 borehole the highest temperature recorded was 58 deg C at the main rift fault zone, which was penetrated at a depth of 564-579 feet. In No. 2 borehole the highest temperature was 55 deg C, and drilling was stopped at 1,294 feet after the main fault zone had been penetrated. In No. 3 borehole, which was located 150 feet west of No. 1, the highest temperature recorded was 72 deg C. (See also W74-08973) (Knapp-USGS)
W74-08978

GEOTHERMAL RESOURCES IN TANZANIA,
Tanzania Mineral Resources Div., Dodoma.
M. A. Nzaro.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1039-1043, 1973. 1 fig, 1 tab, 10 ref.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *Tanzania.

Thermal springs are numerous in Tanzania but their distribution and local concentration is uneven. The main areas of spring activity are in the neighorhood of the rift valleys and block faulted regions associated with the rift systems. In other areas, springs are related to local rock formations such as limestones, quartzites, lavas and sandstones. The existence of thermal springs indicates the presence of geothermal energy. Suitable structures are very likely to occur in Tanzania, in areas where karoo or more recent sediments overlie the basement rocks, and in the vicinity of the springs in the Tertiary volcanic provinces. (See also W74-08973) (Knapp-USGS)
W74-08979

GEOTHERMAL RESOURCES IN INDIA,
Central Water and Power Commission, New Delhi (India).
B. R. R. Iyengar.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1044-1049, 1973. 3 fig, 2 tab, 19 ref.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *India.

Geothermal fields were discovered at several places in India. Neither systematic nor exhaustive studies of these fields have so far been carried out, except for the provision of limited tourist and bathing facilities at the spring sites. No direct relationship has as yet been established between igneous activity and the occurrence of thermal springs. On the basis of limited information, it would appear that the geothermal resources in India are mostly in the form of hot water, with the near-surface temperatures varying from about 80 deg C to just over 100 deg C. Higher flows, temperatures, and pressures are likely to be obtained by drilling at suitable sites in the Pugga and Manikaran geothermal fields. The observed temperature of water in the well at Cambay was about 100 deg C. There are indications that temperatures of the order of 170 deg C may exist at depth in this field. It has been estimated that the maximum amount of power generation would be available by flashing down the water. The maximum generation possible at this point is about 1850 to 2300 kW, based on the estimated flow of each well. On the basis of similar studies, the possible power generation at Manikaran would be in the order of 350 kW and, in the case of Pugga Valley springs, about 400 kW. (See also W74-08973) (Knapp-USGS)
W74-08980

A PROGRAM FOR THE EXPLORATION OF HIGH TEMPERATURE AREAS IN ICELAND,
National Engineering Authority, Reykjavik (Iceland).
S. Bjornsson.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1050-1054, 1973. 4 fig, 1 tab.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power, *Iceland.

In regional geothermal surveys in Iceland, all relevant methods of geology, geochemistry and geophysics are applied to obtain a primary model

of the hydrothermal system and to locate favorable production sites within the area. After a production site is selected, exploratory drilling is carried out. The objective of the drilling is to verify and modify the primary model of the hydrothermal system. It will also furnish critical information for designing production wells and evaluating whether exploitation of the area will be technically possible and economically feasible. If the results of this phase are promising, production drilling and testing will be carried out in several steps to test the production capacity and the reliability of the thermal area. Regional surveys are estimated to take 1-3 years, exploratory drilling at each production site 1-2 years, and production drilling and testing 1-3 years. (See also W74-08973) (Knapp-USGS)
W74-08981

GEOTHERMAL AREAS OF CZECHOSLOVAKIA,
Geoindustria, Prague (Czechoslovakia).
S. Klir.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1055-1058, 1973. 2 fig, 3 ref.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *Czechoslovakia.

The main thermal areas in Czechoslovakia are confined to the Krusne Hory graben in the Bohemian Massif and to a fault system along the River Vah in the West Carpathians. The location, geological situation, and thermal capacity of the springs at the localities of Carlsbad, Sokolov, Teplice, Piestany, Sklenne Teplice, and Banska Stiavnica are described in addition to the methods of using thermal energy. (See also W74-08973) (Knapp-USGS)
W74-08982

GEOTHERMAL EXPLORATION OF HOT WATER SOURCES IN THE CARPATHIANS OF YUGOSLAVIA AND CZECHOSLOVAKIA,
Scintrex Ltd., Concord (Ontario).
B. Krcmar, and B. Milanovic.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1059-1062, 1973. 8 fig.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power, *Yugoslavia, *Czechoslovakia.

There are many hot water sources in the Carpathian system in both Czechoslovak and Yugoslav territories. Temperature measurements are accomplished with the use of the Czechoslovak geothermometer GT-1, which enables sensitive gradient measurements in shallow boreholes at the depth of approx. 0.9 and 1.4 meters. Many of the sources are of small capacity, with temperatures under 70 deg C, but due to suitable mineralization they are appropriate for balneological purposes. Results from Yugoslav localities Vranjska Banja and Sijarinska Banja give some hope of economic potential for power exploitation. (See also W74-08973) (Knapp-USGS)
W74-08983

THERMAL FIELDS OF THE EASTERN CARPATHIANS,
Akademiya Nauk URSR, Kiev. Institut Geofiziki.
R. I. Kutas, and V. V. Gordiyenko.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1063-1066, 1973. 2 fig, 1 tab, 6 ref.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *USSR(Carpathians region).

Heat flow was studied in 43 boreholes within the southwestern slope of the Russian Platform and in the folded Carpathians of the USSR. Four tectonic zones with different geological records have been distinguished in terms of heat flow values: the slope of the Russian Platform and a part of the Carpathian foredeep with the Pre-Cambrian basement--1.05 micro/sq cm/sec; the northern part of the Lvov and Carpathian foredeep with the Paleozoic basement--1.30 micro/sq cm/sec; folded Carpathians--1.75 micro/sq cm/sec; Trans-Carpathian trough--2.15 micro/sq cm/sec. Heat flow depends on the geological age of a given area and does not agree with crustal thickness. The zones of abnormally high heat flow result from the effect of nonstationary heat sources occurring near the crustal bottom. The period of activity of the heat sources shows good agreement with the period of folding in the Carpathians as deduced from the geological evidence. (See also W74-08973) (Knapp-USGS)
W74-08984

DEVELOPMENT OF RESEARCH AND UTILIZATION OF GEOTHERMAL RESOURCES IN THE USSR,
Scientific Council on Geothermal Studies, Moscow (USSR).
A. N. Tikhonov, and I. M. Dvorov.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1072-1078, 1973. 1 tab.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power, *USSR.

Reserves of thermal waters over the range of temperatures from 50 deg to 200 deg C have been tentatively estimated in USSR as being over 8 million cu m per day. Geothermal resources in USSR are being utilized for the purpose of heating, for hot water supply of living and industrial buildings, for heating hotbeds and greenhouses, for growing vegetables, and for cattle-breeding needs, in extracting chemical matter from geothermal waters, for balneology and for electric power generation. (See also W74-08973) (Knapp-USGS)
W74-08985

GEOTHERMAL RESOURCES OF THE USSR AND PROSPECTS FOR THEIR PRACTICAL USE,
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
F. A. Markarenko, B. F. Mavritsky, B. A. Lokshin, and V. I. Kononov.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1086-1091, 1973. 1 fig, 1 tab, 6 ref.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power, *Iceland.

Studies of the principles governing the area extent of thermal waters over USSR territory, and estimates of their heat potential, mineralization, and composition, delineate ten territories for possible utilization. Among them are the platform regions where ther thermal waters are stratified and folded areas, where fissure-vein type hot waters are found. Within these promising regions possible reserves have been estimated for thermal waters with a mineralization not exceeding 35 g/liter, a temperature above 40 deg C, and at a depth not exceeding 3,000 m. These reserves are over 250 cu m per sec. (See also W74-08973) (Knapp-USGS)
W74-08986

THERMAL WATERS OF GEORGIA,
Gruzinskii Politekhnicheskii Institut, Tiflis (USSR).
I. M. Buachidse, G. I. Buachidse, and M. P. Shaorshadse.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1092-1101, 1973. 2 fig, 1 tab, 10 ref.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *USSR(Georgia).

Thermal waters have been known in Georgia, USSR, since ancient times. Various types of thermal waters are found in Georgia from fresh hydrocarbonate calcium to highly mineralized chloride. In gas composition, nitrogen prevails though carbon dioxide and hydrocarbons are found. Thermal waters discharge in three places in the folded system of the Great Caucasian southern slope, are widely developed on the Georgian block and in the folded system of the Adjara-Trialeti, and are also found at some points in the Artvin-Somkhiti block. The Georgian block is the richest in thermal waters. The main thermal horizon is in lower-Cretaceous deposits, which, for the most part, contain low mineralized infiltrated waters of modern age, atmospheric nitrogen, temperatures reaching 105 deg C, and a total debit of 650 liter/sec. In the Adjara-Trialeti folded system, the most important waters are those of the Middle-Eocene deposits, which are typical of the nitrogen thermal waters of modern age with temperatures of 70 deg - 80 deg C and a total output of 210 liter/sec. Thermal waters of Georgia are used (and in the future will be used more widely) at the balneologic resorts, in greenhouse economy, in the processing industry, and for the local heating systems of small and medium populated areas. (See also W74-08973) (Knapp-USGS)
W74-08987

RECENT HYDROTHERMAL SYSTEMS OF KAMCHATKA,
Institut Vulkanologii, Petropavlovsk-Kamchatskii (USSR).
E. A. Vakin, B. G. Polak, V. M. Sugrobov, E. N. Erlikh, and V. I. Belousov.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1116-1133, 1973. 11 fig, 4 tab, 25 ref.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *USSR(Kamchatka).

Recent hydrothermal activity was studied in Uzon-Semyachik, Pauzhetka-Kambalny and other regions in Kamchatka. In the area of recent volcanism characterized by a general increase of conductive heat flow, some regions can be distinguished by an especially intense geothermal regime with additional supply of heat by deep

fluids. Recent hydrothermal systems of Kamchatka are small artesian basins and artesian slopes. They are associated with volcano-tectonic grabens and circular depressions filled with a series of tufaceous material of mainly acid composition. Usual hydrodynamic methods can be used for a quantitative estimation of reserves. Hydrothermal activity is one of the manifestations of the general geothermal activity of the region. (See also W74-08973) (Knapp-USGS)
W74-08989

GEOLOGY AND GEOTHERMAL POWER POTENTIAL OF THE TATUN VOLCANIC REGION,
Mining Research and Service Organization, Taipei (Taiwan).
C. H. Chen.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1134-1143, 1973. 5 fig, 1 tab, 13 ref.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *Taiwan(Tatum volcanic region), Republic of China.

Geothermal resources in the Tatun volcanic region of Taiwan occur in an area of about 350 sq km containing Plio-Pleistocene andesitic and basaltic lavas, pyroclastics, and detritus. Most of the andesitic lavas in the region are compact and impermeable. Unless highly fractured they cannot be good reservoir rock. The basement is composed of Miocene sediments of marine and continental facies. The Lower Miocene Wuchihshan formation consists mainly of thick-bedded to massive sandstone that could be good reservoir rock. There are 13 hot-spring areas in the volcanic region, which constitute a zone about 18 km long and 3 km wide, extending from Peitou to Chinshan. Most of the hot springs issue acid sulphate-chloride water. Acid chloride water with temperatures lower than 200C and pH values less than 4 was found in the Wuchihshan sandstone under the Tahuangtsui thermal area. Wet steam containing about 25% of water (maximum temperature > 240 deg C, pH = 3.9 to 6.7) was found in fractured andesites under the Matsao thermal area. The power potential of the whole hot-spring zone is conservatively estimated to be 80 MW to 200 MW. (See also W74-08973) (Knapp-USGS)
W74-08990

RECENT PLANS OF GEOTHERMAL EXPLOITATION,
Japan Metals and Chemicals Co. Ltd., Morioka. Geothermal Power Div.
Y. Mori.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1144-1149, 1973. 4 fig, 2 tab.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *Japan.

Prospecting in Japan is being carried out in order to build two more geothermal powerplants besides the one of 20,000 kW now in operation. The exploitable area seems to be wider than first expected, and the Kakkonda River area is more advantageous in natural resources than Matsukawa. Kakkonda is located 7 km southwest of Matsukawa. Here, the steaming ground stretches as far as a 3 x 5 km area without any caprock. Cooling water is also abundant, and the amount is ten times as much as that of Matsukawa. Chemical quality of the steam is excellent with pH 7-8 compared with 5 in the case of Matsukawa. The power in prospect at Kakkonda is approximately 200,000 kW while that of Matsukawa amounts to only 100,000 kW. The topography is not as steep as in Matsukawa. (See also W74-08973) (Knapp-USGS)
W74-08991

EXPLOITATION OF THE MATSUKAWA GEOTHERMAL AREA,
Japan Metals and Chemicals Co. Ltd., Morioka. Geothermal Power Div.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, p 1150-1156, 1973. 6 fig, 4 tab.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power, *Japan(Matsukawa).

In Matsukawa, Japan, the local government of the village began in 1952 the experimental development of hot springs for health purposes. In this process steam blew out (instead of hot water) from a depth of 150-300 meters. In 1960, two wells 350 and 425 meters deep were experimentally drilled. The temperature in those bores changed seasonally, partly because of the low temperature of the underground water near the land surface. New wells for steam production should be as deep as 1200 meters. Construction of a 5,000 kW electric plant was planned. In 1964 the construction work started. In 1965 the first plan for 5,00 kW was changed to 20,000 kW. The discharge of No 1 well decreased, and one more well had to be added. At present, steady full load operation is 20,000 kW. The power capacity in the Matsukawa area is estimated to be approximately 100,000 kW; investigations are being continued. See also W74-08973) (Knapp-USGS)
W74-08992

THE GEOTHERMAL SYSTEM OF THE KAKONE VOLCANO,
Hot Spring Research Inst. of Kanagawa Prefecture, Hakone (Japan).
Y. Oki, and T. Hirano.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *Japan(Hakone Volcano).

The isothermal map of the Hakone volcano, Japan, at sea level shows that the geothermal area now 12 by 13 km in diameter is clearly related to the present volcanic activity. Four zones are recognized in the distribution of thermal waters. Zone I is characterized by acid-sulfate water associated with solfataric gases, and is found at the highest elevation of the volcano. Zone II is characterized by bicarbonate-sulfate water issuing at the middle elevation. Zone III has high-temperature streams rich in sodium chloride, poor in bicarbonate and sulfate, flowing from the depth of active fumaroles across the zone of bicarbonate-sulfate water (zone II). Zone IV is characterized by sodium chloride-bicarbonate-sulfate water discharged at the lowest elevation. Groundwater which infiltrates through the western side of the caldera seems to be flowing eastward, passing through the basal part of central cones where high-temperature dense steam is coming up through volcanic vents. Subsurface streams of high-temperature waters thus start from the vent area, run through the permeable zone mixing with groundwater, and appear as hot springs on the steep slopes of the Hayakawa gorge at the east. The average contribution of volcanic dense steam rich in sodium chloride is estimated to be 25 to 35% to the sodium chloride water of zone III. Thermal discharge evaluated by the geochemistry of sodium chloride water is 21 to 30 million cal/sec, which suggests that the energy economy of the Hakone geothermal system is essentially controlled by the activity of dense steam carrying a considerable amount of sodium chloride. (See also W74-08973) (Knapp-USGS)
W74-08993

TYPES OF COMMERCIAL DEPOSITS OF THERMAL UNDERGROUND WATERS AND SOME VIEWS ON THE ASSESSMENT OF THEIR RESERVES,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoi Geologii, Moscow (USSR).
N. M. Frolov, and G. S. Vartanian.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1167-1174, 1973. 4 fig, 17 ref.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power.

All known ground thermal water occurrences of the world may be grouped into the following main types, based on geological and hydrodynamic conditions: thermal water occurrences of large artesian basins of platform areas; thermal water occurrences of small artesian basins of intermontane areas and submontane troughs of alpine zones of folding; and thermal water occurrences of crystalline massifs connected with fissure-vein systems of recent tectonic disturbances. Large artesian thermal water occurrences occur usually at a great depth and are notable for a high salinity. Among the thermal water occurrences of alpine type, thermal water occurrences confined to the areas of late and recent volcanism are of the greatest industrial interest. (See also W74-08973) (Knapp-USGS)
W74-08994

THERMAL STUDIES AS A TECHNIQUE IN SUBSURFACE STRUCTURAL INVESTIGATIONS,
Akademiya Nauk Azerbaidzhanskoi SSR, Baku. Inst. of Problems of Deep Oil and Gas Deposits.
S. T. Ovnatanov, and G. P. Tamrazyan.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1184-1190, 1973. 4 fig.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power.

Thermal studies can be used to reveal the peculiarities of the geological structure of oil- and gas-bearing regions. The studies conducted make it possible to get valuable information concerning the subsurface structure. These studies help to find buried uplifts. On the basis of thermal studies the subsurface occurrence (under marine conditions) of a gas-mud volcano was predicted. The drilling conducted later confirmed the presence of the volcano. Forecasting of the buried mud volcanoes is used to locate the occurrence of oil- and gas-bearing suites at depth. Also, the study of thermal subsurface fields helps to determine the conditions of distribution of oil and gas reservoirs, which is of practical importance in field prospecting and development. (See also W74-08973) (Knapp-USGS)
W74-08995

GEOHYDROLOGY OF THE LAUGARNES HYDROTHERMAL SYSTEM IN REYKJAVIK, ICELAND,
National Energy Authority, Reykjavik (Iceland).
T. Thorsteinsson, and J. Eliasson.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1191-1204, 1973. 11 fig, 4 tab, 8 ref.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power, *Iceland.

A geohydrologic survey was made in 1965 in the Laugarnes hydrothermal system in Reykjavik, Iceland. The survey was conducted by recording gages and by periodic measurements of water levels in nonpumping wells. A mathematical analysis of the relation between water levels and pumping rates and of the response of the water level to changes in atmospheric pressure, oceanic tides, and earthquakes shows the effects of volume elasticity of the Laugarnes aquifers and their water. The test data gave values ranging from 0.0035 to 0.0088 for the coefficient of transmissivity and 0.000039 to 0.00032 for the coefficient of storage. The aquifers appear to be impermeably bounded on two sides, the boundaries intersecting at an angle of 60 to 90 degrees. A decline of water level of 66.8 meters was computed for the period January 1957 to August 1969, and a further decline of 6.2 meters for the 5-year period August 1969 to August 1974, assuming 1968 to 1969 pumping rates. (See also W74-08973) (Knapp-USGS)
W74-08996

GEOTHERMAL FIELDS IN JAPAN CONSIDERED FROM THE GEOLOGICAL AND PETROLOGICAL VIEW POINT,
Hokkaido Univ., Sapporo (Japan). Dept. of Geology and Mineralogy.
T. Ishikawa.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1205-1211, 1973. 3 fig, 16 ref.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *Japan.

Heat sources of most geothermal fields in Japan are related to young volcanoes or pre-Quaternary intrusives. Acidic magmas are more significant for generation of geothermal areas than basic ones. In Japan, geothermal areas nearly always develop around lava domes built of dacite and andesite. Lava domes plug crater vents and prevent gas and heat accumulated at depth from excaping into the air. (See also W74-08973) (Knapp-USGS)
W74-08997

CONTINENTAL DRIFT AND THERMAL FIELDS,
Akademiya Nauk Azerbaidzhanskoi SSR, Baku. Institut Geologii.
G. P. Tamrazyan.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1212-1225, 1973. 9 fig, 15 ref.

Descriptors: *Geothermal studies, *Termal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *USSR, *Continental drift.

The separation of platform regions during continental drift results in large depressions in which the more intensively heated deep-seated masses approach the earth surface. Major thermal anomalies originate in these areas. All the most important high-temperature regions of the USSR (the West-Siberian, Turan, Caspian lowlands, the pre-Caucasus, the Kuban lowland, the Crimea Stedpe, and other regions) are situated just between the separated edges of the West-Siberian ruptured joint and in its branchings. The continental drift ideas are of paractical importance with regard to prospecting for the interior heat of the earth, as they outline vast areas characterized by sharply intensified heat fields. (See also W74-08973) (Knapp-USGS)
W74-08998

GEOTHERMAL RESOURCES AND PRESENT OROGENIC ACTIVITY,
Stutthart Univ. (West Germany). Geologisch-Palaeontologisches Institut.
H. G. Wunderlich.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1226-1230, 1973. 8 fig.

Descriptors: *Geothermal studies, *Thermal water, *Orogeny, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology,
Identifiers: *Geothermal power, *Orogeny.

Some zones of abnormally high heat flow show a characteristic position relative to young orogenic belts. Usually, orogenic fronts are combined with low heat flow values in the foreland and high heat flow behind the front. Geothermal resources of economic interest may be expected where volcanic activity, heat conductivity of the crust, and orogenic heat concentration are working together. Young orogenic fronts are distinguished by strong negative gravity anomalies shifted outward in the foreland direction. The inner girdle of such active orogens is marked by volcanoes, by large volumes of granitic material (if enclosed in the continental crust), and by regional metamorphism as an indication of intensified heat flow. Present orogenically intensified heat flow behind the active orogenic fronts is shown by a series of maps. (See also W74-08973) (Knapp-USGS)
W74-08999

GEOPHYSICAL EXPLORATION THROUGH GEOLOGIC COVER,
D. W. Strangway.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1231-1243, 1973. 16 fig, 37 ref.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power.

Some of the techniques that can be applied to the problem of geophysical exploration beneath various kinds of cover and overburden are discussed. The electrical properties found in different geographic environments and the problems of exploring in areas of high resistivity and low resistivity cover are reviewed. Induced polarization, electromagnetic sounding, magnetotellurics and radio frequency interferometry have a particular application in areas of high resistivity cover. The problem of exploring in areas of low resistivity cover is much more difficult. The induced polarization technique can be used in these cases, but it requires a better understanding of the problems of electromagnetic coupling. New techniques of data processing and filtering can help significantly in the problem of aeromagnetic interpretation in areas of volcanic cover. (See also W74-8973) (Knapp-USGS)
W74-09000

GEOTHERMAL PROSPECTING IN SHALLOW HOLES AND ITS LIMITATIONS,
Institute of Applied Geophysics, Prague (Czechoslovakia).
D. Dedkova, J. Halousek, B. Krcmar, and K. Prihoda.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1244-1249, 1973. 4 fig, 8 ref.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power.

Difficulty of temperature measurement in boreholes considerably limits the sensitivity depth of geothermal investigations. From the point of view of the attainable accuracy and reproducibility, error sources, both instrumental and in the temperature field itself, are analyzed. The design of a Czechoslovak geothermometer GT-1 with reproducibility better than 0.04 deg C is comprehensively described. Some possibilities of improvements in geothermal prospecting in shallow holes, such as the gradient method, standard points method, and long-term variation corrections, are outlined. Some examples of hydrogeological, sulfidic ores, and speleological investigations are given. (See also W74-08973) (Knapp-USGS)
W74-09001

ORIGIN OF GEOTHERMAL WATERS OR NATURAL STEAM,
Mineral Research and Exploration Inst., Ankara (Turkey).
S. Kavlakoglu.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1250-1255, 1973. 12 fig, 17 ref.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power.

For the generation of geothermal water or natural steam, a reservoir of meteoric water, a heat source, and a mass of dynamic meteoric water circulating through natural permeable channels to the heat source and back to the meteoric water reservoir through a different permeable channel are required. A discussion is given for two cases; one for the case of heated meteoric water, the other for heated meteoric water mixed with juvenile water from the heat source. Using Darcy's law with the theoretical treatment of invasion, it is shown that the heated water from the heat source would invade the static reservoir along a wide based cylindrical zone in both cases. Verification of this theoretical finding was demonstrated through geophysical and drilling results at the Gecik-Afyon and Saraykoy-Denizli geothermal areas in Turkey and the Broadlands geothermal area in New Zealand. (See also W74-08973) (Knapp-USGS)
W74-09002

EVALUATION OF OPERATIONAL RESERVES OF HIGH TEMPERATURE WATERS,
Institut Vulkanologii, Petropavlovsk-Kamchatskii (USSR).
V. M. Sugrobov.

In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1256-1260, 1973. 3 fig, 2 tab, 6 ref.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power, USSR.

Resources of geothermal steam in the USSR are at present evaluated on the basis of the discharge of steam-water mixture. Evaluation of exploitational resources of thermal waters for a certain period of exploitation of a deposit may be done by definition of the decline of piezometric level according to the unsteady filtration formula. Continuous exploitation of the systems is maintained by outflow of heat, which is located in the heated rocks, and by the inflow of the geothermal deep-seated steam to the zone of depression with intensive outflow of the mass and heat from the upper horizons. (See also W74-08973) (Knapp-USGS)
W74-09003

TERRESTRIAL HEAT FLOW IN THE TERRITORY OF CZECHOSLAVAKIA AND THE MEASUREMENT OF THERMAL CONDUCTIVITY WITH FULLY-AUTOMATIC APPARATUS,
Ceskoslovenska Akademie Ved, Prague. Geofyzikalni Ustav.
For primary bibliographic entry see Field 4B.
W74-09004

HEAT AND MASS TRANSFER IN HYDROTHERMAL SYSTEMS, PHYSICAL-MATHEMATICAL MODELS AND EXPERIMENTS,
Institut Geokhimii, Irkutsk (USSR).
V. N. Kochergin, and V. D. Pampura.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1266-1269, 1973. 3 fig, 2 ref.

Descriptors: *Heat transfer, *Mass transfer, *Hydrothermal studies, *Geothermal studies, Convection, Mathematical models, Hydraulic models, Heat flow, Thermal conductivity, Hydraulic conductivity.
Identifiers: USSR.

In order to investigate processes of heat and mass transfer as well as the dynamics of the formation of temperature fields of natural hydrothermal systems, physico-mathematical models were developed which accounted for conditions of contemporary hydrothermal processes (temperature, pressure, thermo-physical properties, of rocks, and latent heats of transitions). The mathematical model consists of a system of partial differential equations for a two-layer medium (liquid and solid) with an immobile boundary between solid and liquid phases. Models of this type were performed on an IBM computer. Physical models were carried out by means of a hydrothermal experiment at elevated temperatures (up to 200 deg C) and pressures. (See also W74-08973) (Knapp-USGS)
W74-09005

STUDY OF HEAT CONDUCTION MODELS OF GEOTHERMAL ENERGY RESERVOIRS,
Mining Research and Service Organization, Taipei (Taiwan).
C. Y. Meng, and P. T. Shaw.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1270-1274, 1973. 9 fig, 3 ref.

Descriptors: *Heat transfer, *Mass transfer, *Hydrothermal studies, *Geothermal studies, Convection, Mathematical models, Hydraulic models, Heat flow, Thermal conductivity, Hydraulic conductivity.
Identifiers: USSR.

Temperature anomalies in a rock formation are direct evidence of the existence of geothermal reservoirs. Prospecting for geothermal energy by measurement of the temperature gradient in the rock formation overlying a geothermal reservoir could, theoretically, be effective. Thermal conduction models of different presumed geothermal reservoir shapes are discussed. A geothermal reservoir is considered to be a constant hot body overlain by physically uniform rock formations. Temperature distribution in the overlying rock formation may be represented by the surfaces of constant temperature whose shapes are closely related to the shape of the hot body. The shape of temperature curves at equal depth in a vertical cross-section reflects also the depth, shape, and size of the geothermal energy reservoir. The differences in material and inflow of groundwater in the overlying formation would seriously affect the temperature distribution, the shape of the constant temperature surfaces, and the shape of the temperature curve for the equal depths, consequently making them differ from the models. (See also W74-08973) (Knapp-USGS)
W74-09006

ENDOCLAVE, A NEW DEVICE FOR THE STUDY OF HEAT AND MASS TRANSFER BY SIMULATION OF GEOLOGICAL BODIES AND PROCESSES UNDER DYNAMIC CONDITIONS,
Akademiya Nauk SSSR, Novosibirsk. Institut Geologii i Geofiziki.
A. N. Dudarev.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1275-1279, 1973. 2 fig, 2 tab.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Laboratory equipment, Heat flow, Mass transfer, Hydraulic models, Autoclaves.
Identifiers: *Endoclaves.

For simulating geodynamic processes, a thermogradient endoclave permits simultaneous wide-range investigations of petrophysical thermodynamics in simulated systems. Rock volumes may be up to 2 cu m. During the experiment all the surface of the rock block is open and accessible for measurements. It is possible to generate radial and vertical gradient fields of temperatures inside the sample from 0 to 150-200 deg C/cm, both dry and wet. (See also W74-08973) (Knapp-USGS)
W74-09007

HEAT TRANSFER MEASUREMENT IN THE OWAKUDANI AND SOUNZAN GEOTHERMAL AREAS, HAKONE VOLCANO,
National Research Center for Disaster Prevention, Tokyo (Japan).
K. Yuhara.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970. Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1280-1288, 1973. 9 fig, 6 tab, 8 ref.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Heat transfer, *Heat flow, Volcanoes, Stream, Sampling, Thermal water, Thermal springs, Data collections, Borehole geophysics, Mass transfer, Thermal conductivity.
Identifiers: *Geothermal power, *Japan.

In geothermal areas, heat is transferred by various processes, such as fumaroles, steam wells, hot springs, steaming grounds, evaporation from hot pools and thermal conduction through the earth. As a practical example, heat transfer measurements in the Owakudani and Sounzan geothermal areas of Hakone volcano, Japan, are outlined. Total mass discharge from these areas amounts to 129 kg/sec and total heat transfer amounts to 10.24 million cal/sec. In Japan where there are about twenty geothermal areas, each having the same size as the Owakudani and Sounzan areas put together, the thermal discharge from all these areas may be estimated roughly to be 2 x 10 to the 23rd power erg/year. In addition to this, the energy released by volcanic activity is 7 x 10 to the 23rd power erg/year, by common hot springs, 1.1 x 10 to the 24th power erg/year, and by the normal heat flow of nonvolcanic regions, 7.3 x 10 to the 24th power erg/year. The total energy released from the whole of Japan, except that by earthquakes, is about 9 x 10 to the 24th power erg/year. (See also W74-08973) (Knapp-USGS)
W74-09008

AN ESTIMATE OF THE NATURAL HEAT RESOURCES IN A THERMAL AREA IN ICELAND,
Oregon State Univ., Corvallis. Dept. of Oceanography.
G. Bodvarsson.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1289-1293, 1973. 1 fig, 10 ref.

Descriptors: *Geothermal studies, *Investigations *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power, *Iceland.

Various geological and geophysical principles involved in te exploitation of geothermal areas are summarized for the Hengill high-temperature thermal area located 30 to 40 km east of the city of Reykjavik, Iceland. The rate at which stored heat can be tapped depends on the availability of water. An estimate of the order of magnitude of the total recoverable heat resources in the Hengill area, based on a reservoir model, indicates that a total of the order of 10,000 million metric tons of water at 220 to 230 deg C could be produced in this area during a period of 100 years. This water is flashed in the boreholes and will yield a total of 250 million tons of dry saturated steam with a pressure ranging from 10 to 2 atmospheres. The estimated production rate of steam is of the order of 3000 tons/hour, or comparable to the production which has already been obtained in the geothermal area at Larderello in Tuscany, Italy. The production costs, based on the rate of 300 tons/hour of steam, are estimated at $ 0.16/ton steam, and the investment necessary is estimated at $5,000.00/ton steam/hour. Corresponding figures for larger installations would probably be somewhat lower. (See also W74-08973) (Knapp-USGS)
W74-09009

GROUND SUBSIDENCE OF A GEOTHERMAL FIELD DURING EXPLOITATION,
Ministry of Works, Wairakei (New Zealand).
For primary bibliographic entry see Field 4B.
W74-09010

EFFECT OF EARTH STRAIN ON GEYSER ACTIVITY,
Colorado Univ., Boulder. Dept. of Mechanical Engineering.
J. S. Rinehart.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1297-1301, 1973. 8 fig, 9 ref.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Geysers, *Earthquakes, Strain, Movement, Thermal water, Stress.
Identifiers: *Yellowstone National Park, *Earth strain.

The very extensive and detailed records that have been kept for the past three decades on the activity of Old Faithful Geyser, located in Yellowstone National Park, make it possible to establish causative relationships between earth strain and geyser activity. A 2- or 3- year steady decrease in average interval between eruptions can precede a large earthquake. This is followed at the time of the earthquake by a sudden lengthening of interval which continues for about fifteen days. Local earthquakes of intensity V or greater can be presaged and accompanied by a gradual and regular decrease in interval over a time span of a few days, followed by an abrupt increase. Such a pattern of change is not always accompanied by an earthquake; this probably indicates non-catastrophic release. of strain. While the effects of varying earth strains are recognizable, they do not appear to be a major factor in controlling the efflux of geothermal energy. (See also W74-08973) (Knapp-USGS)
W74-09011

PHOTOGRAMMETRIC TECHNIQUES APPLIED IN THE DEVELOPMENT OF GEOTHERMAL RESOURCES IN MATSUKAWA AND OTAKE GEOTHERMAL AREAS USING A VECTOR METHOD,
International Geodetic Survey Inst. Co. Ltd., Tokyo (Japan).
For primary bibliographic entry see Field 4B.
W74-09012

CHEMISTRY IN THE EXPLORATION AND EXPLOITATION OF HYDROTHERMAL SYSTEMS,
Department of Scientific and Industrial Research, Wellington (New Zealand). Chemistry Div.
For primary bibliographic entry see Field 2K.
W74-09013

STATICAL INTERPRETATION OF CHEMICAL RESULTS FROM DRILLHOLES AS AN AID TO GEOTHERMAL PROSPECTING AND EXPLOITATION,
Department of Scientific and Industrial Research, Wellington (New Zealand).
For primary bibliographic entry see Field 4B.
W74-09014

ORIGIN OF THERMAL WATERS ON THE BASIS OF THEIR RADIOISOTOPIC CONTENT,
Adademiya Nauk SSSR, Moscow. Geologicheskii Institut.
For primary bibliographic entry see Field 2K.
W74-09015

THE COLLECTION AND ANALYSIS OF VOLCANIC AND HYDROTHERMAL GASES,
Department of Scienfific and Industrial Research, Taupo (New Zealand). Chemistry Div.
For primary bibliographic entry see Field 2K.
W74-09016

INTERPRETATION OF GAS COMPOSITIONS FROM THE WAIRAKEI FIELD OVER 10 YEARS,
Department of Scientific and Industrial Research, Taupo (New Zealand). Chemistry Div.
For primary bibliographic entry see Field 2K.
W74-09017

HIGH ACTIVITY HYDROTHERMAL ZONES DETECTED BY NA/K, CERRO PRIETO, MEXICO,
Comision Federal de Electricidad, Mexico City. Geothermochemical Research.
For primary bibliographic entry see Field 2K.
W74-09018

CHEMICAL STUDIES IN MEXICAN GEOTHERMAL FIELDS,
Comision Federal de Electricidad, Mexico City. Inst. of Investigations of Electrical Industry.
For primary bibliographic entry see Field 2K.
W74-09019

GEOCHEMISTRY OF THE AHUACHAPAN THERMAL AREA, EL SALVADOR, CENTRAL AMERICA,
Iceland Univ., Reykjavik. Science Inst.
For primary bibliographic entry see Field 2K.
W74-09020

A NOTE ON THE HOT SPRINGS OF ECUADOR,
Proyecto Minero, Quito (Ecuador).
For primary bibliographic entry see Field 2K.
W74-09021

DEUTERIUM AND CHLORIDE IN GEOTHERMAL STUDIES IN ICELAND,
Iceland Univ., Reykjavik. Science Inst.
For primary bibliographic entry see Field 2K.
W74-09022

CHEMICAL PROSPECTING OF STEAM AND HOT WATER IN THE MATSUKAWA GEOTHERMAL AREA,
Japan Metals and Chemicals Co., Ltd., Morioka.
For primary bibliographic entry see Field 2K.
W74-09023

GEOCHEMISTRY OF THE WATERS DISCHARGED FROM DRILLHOLES IN THE OTAKE AND HATCHOBARU AREAS,
Kyushu Univ., Beppu(Japan). Inst. of Balneotherapeutical Research I.
For primary bibliographic entry see Field 2K.
W74-09024

THE BEHAVIOUR OF THE WAIRAKEI GEOTHERMAL FIELD DURING EXPLOITATION,
Ministry of Works, Wellington (New Zealand).
For primary bibliographic entry see Field 4B.
W74-09025

A STUDY OF THE RESERVOIR AT THE MATSUKAWA GEOTHERMAL FIELD,
Geological Survey of Japan, Kawasaki.
For primary bibliographic entry see Field 4B.
W74-09026

SOME GEOTHERMAL MEASUREMENTS AT THE OTAKE GEOTHERMAL AREA,
Kyushu Univ., Fukuoka (Japan). Research Inst. of Industrial Science.
M. Fukuda, K. Ushijma, K. Aosaki, and N. Yamamuro.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics, 1970, Special Issue 2, Vol 2, Part 2, p 1448-1457, 1973. 15 fig, 6 tab, 4 ref.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power, *Japan(Otake).

Thermal discharge, temperature gradient and thermal conductivity of rock samples were measured at Otake geothermal area, Japan. The heat flow from the strong fumaroles was measured by condensing the natural steam. The heat flow from the weak fumaroles was measured by using a wet and dry bulb thermometer. The underground temperature gradient is 1.9 deg C/m in steaming ground and 0.8 deg c/m in other geothermal areas. The thermal conductivity of 30 dried core samples was measured in the laboratory and in situ by means of the line sorce methods. The range is 0.000773 to about 0.0172 cal/sec cm C. The thermal conductivity of unaltered rocks is greater than that of altered ones. (See also W74-08973) (Knapp-USGS)
W74-09027

ESTIMATION OF HYDROTHERMAL SYSTEMS BY MEANS OF WELL-HEAD OBSERVATIONS,
National Research Center for Disaster Prevention, Tokyo (Japan).
For primary bibliographic entry see Field 4B.
W74-09028

GEOTHERMAL DRILLING AND PRELIMINARY TEST OPERATIONS AT KIZILDERE, TURKEY,
Mineral Research and Exploration Inst., Ankara (Turkey). Technical data.
For primary bibliographic entry see Field 8A.
W74-09029

PRESENT STATE OF DRILLING AND REPAIRING OF GEOTHERMAL PRODUCTION WELLS IN JAPAN,
Teiseki Sakusei Kogyo Co. Ltd. (Japan).
For primary bibliographic entry see Field 8A.
W74-09030

GEOTHERMAL DRILLING IN THE MATSUKAWA AREA,
Japan Metals and Chemicals Co. Ltd., Morioka.
For primary bibliographic entry see Field 8A.
W74-09031

CASING STRING DESIGN FOR GEOTHERMAL WELLS,
Ministry of Works, Wellington (New Zealand).
For primary bibliographic entry see Field 8A.
W74-09032

EFFECT OF SLOTTED LINEAR CASING IN GEOTHERMAL BORES,
Japan Metals and Chemicals Co. Ltd., Morioka. Geothermal Power Div.
For primary bibliographic entry see Field 8A.
W74-09033

FACTORS CONTROLLING BOREHOLE PERFORMANCE,
Department of Scientific and Industrial Research. Taupo (New Zealand).
R. James.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1502-1515, 1973. 10 fig, 10 ref.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Water yield, *Thermodynamics, Hydrogeology, Discharge(Water), Drawdown, Steam, Hydrodynamics, Boreholes.
Identifiers: *Well efficiency, *Geothermal power, *Well performance.

Geothermal boreholes were studied to estimate maximum discharges when drawing on (a) a source of pressurized hot water, (b) a source of dry or superheated steam. Where infinite permeability existing at depth (which is common in areas similar

to that at Wairakei, New Zealand), only geometry of the hole controls the flow rate. Also investigated was the effect on discharge of increased hole size throughout the depth or over fractions of the depth, with resultant flow increases quantitatively established. The relationships derived enable fall in borefield discharge to be predicted for known decline in temperature and pressure within the reservoir. The enthalpy may be accurately determined by a method using the maximum running pressure, the wellhead pressure at which imminent collapse of the stream-water mixture occurs, and the bottom hole pressure. A critical discharge pressure tapping located at the pipe outlet face may then measure flow rates direct over a range of wellhead pressures and hence supply the data required to plot the borehole characteristic curve. The conditions were also considered where rock permeability controls the flow into the bottom of boreholes either from radial fissures or from permeable-porous media. (See also W74-08973) (Knapp-USGS)
W74-09034

CURRENT STATUS OF GEOTHERMAL POWER PLANTS AT THE GEYSERS, SONOMA COUNTY, CALIFORNIA,
Pacific Gas and Electric Co., San Francisco, Calif. Dept. of Engineering.
For primary bibliographic entry see Field 4B.
W74-09035

PHYSICO-CHEMICAL SAMPLING OF HIGH TEMPERATURE WELLS IN CONNECTION WITH THEIR ENCRUSTATION BY CALCIUM CARBONATE,
Adademiya Nauk SSSR, Novosibirsk. Institut Neorganicheskoi Khimii.
For primary bibliographic entry see Field 4B.
W74-09036

PRODUCTION OF FRESH WATER FROM THE ENDOGENOUS STEAM OF CERRO PRIETO GEOTHERMAL FIELD,
Comision Federal de Electricidad, Mexico City.
For primary bibliographic entry see Field 3A.
W74-09037

THERMAL WATERS AS A SOURCE FOR EXTRACTION OF CHEMICALS,
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
For primary bibliographic entry see Field 2K.
W74-09038

EXPLORATION OF THE REYKIANES THERMAL BRINE AREA,
National Energy Authority, Reykjavik (Iceland).
For primary bibliographic entry see Field 2K.
W74-09039

CONTRIBUTION TO THE MINERAL EXTRACTION FROM SUPERSATURATED GEOTHERMAL BRINES, SALTON SEA AREA, CALIFORNIA,
For primary bibliographic entry see Field 2K.
W74-09040

GEOTHERMAL PRODUCTION OF ELECTRICAL ENERGY AND CERTAIN MINERALS,
Makerere Univ., Kampala (Uganda). Dept. of Physics.
J. O. Ilukor.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1656-1657, 1973. 3 tab.

Descriptors: *Hydrothermal studies, *Mineral water, Hot springs, Thermal springs, Thermal water, Thermal power, Brines, Water chemistry.
Identifiers: *Geothermal power, *Uganda.

Geothermal manifestations in Uganda are listed. Their exploitation could be of great interest both from an energy point of view and for minerals. There are probably over 20 centers of hot water springs in Uganda and most of them are located in the western arm of the East African Rift valley around the Ruwenzori range of mountains. (See also W74-08973) (Knapp-USGS)
W74-09041

GEOTHERMAL ENERGY RESOURCES FOR HEATING AND ASSOCIATED APPLICATIONS IN ROTORUA AND SURROUNDING AREAS,
Ministry of Works, Rotorua (New Zealand).
For primary bibliographic entry see Field 4B.
W74-09042

SOME METHODS OF DEALING WITH LOW ENTHALPY WATER IN THE ROTORUA AREA OF NEW ZEALAND,
Cooke (W. L.) Ltd, Auckland (New Zealand).
For primary bibliographic entry see Field 4B.
W74-09043

TECHNICAL-ECONOMIC ESTIMATION OF GEOTHERMAL RESOURCES,
Akademiya Nauk URSR, Kiev. Inst. of Technical Thermophysics.
For primary bibliographic entry see Field 6B.
W74-09044

THE ECONOMICS OF THE SMALL GEOTHERMAL POWER STATION,
Department of Scientific and Industrial Research, Wairakei (New Zealand). Chemistry Div.
For primary bibliographic entry see Field 6C.
W74-09045

ECONOMICS OF THE GEYSERS GEOTHERMAL FIELD, CALIFORNIA,
Thermal Power Co., San Francisco, Calif.
For primary bibliographic entry see Field 6C.
W74-09046

ECONOMICS OF GEOTHERMAL ELECTRIC POWER GENERATION AT MATSUKAWA,
Japan Metals and Chemicals Co. Ltd., Tokyo. Exploitation Dept.
For primary bibliographic entry see Field 6C.
W74-09047

WAIRAKEI POWER STATION NEW ZEALAND--ECONOMIC FACTORS OF DEVELOPMENT AND OPERATION,
Ministry of Works, Wellington (New Zealand).
For primary bibliographic entry see Field 6C.
W74-09048

NEUTRON WELL LOGGING IN HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 4B.
W74-09053

SOME ASPECTS OF APPROXIMATING AQUIFER DISCHARGE,
Army Engineer District, Los Angeles, Calif. Flood Plain Management Section.
D. L. Gundlach.
Ground Water, Vol 12, No 3, p 135-139, May-June 1974. 5 fig, 1 tab, 4 ref.

Descriptors: *Water yield, *Discharge(Water), *Groundwater movement, *Darcy's law, Aquifer characteristics, Transmissivity, Artesian aquifers, Confined water, Equations.

Differential equations based on Darcy's equation and the equation of continuity give the steady-flow discharge rate for confined aquifers in which the cross-sectional area and permeability vary from point to point. For the general cast the derived discharge expression is theoretically exact, whereas, for specific cases an approximate form can be used depending on the boundary conditions. Integration of the approxmiate form for a given aquifer length yields simplified solutions for discharges where the variation in cross-sectional area and permeability with distance in the direction of flow can be described by some mathematical expression. (Knapp-USGS)
W74-09096

DIGITAL-COMPUTER PROGRAMS FOR ANALYSIS OF GROUND-WATER FLOW,
Geological Survey, Little Rock, Ark.
M. S. Bedinger, J. E. Reed, and J. D. Griffin.
Open-file report, 1973. 85 p, 10 fig, 4 tab, 9 ref.

Descriptors: *Computer programs, *Groundwater movement, *Surface-groundwater relationships, *Evapotranspiration, Mathematical models, Water level fluctuations, Hydrogeology, Finite element analysis, Numerical analysis.

Three digital computer programs--GROUNDWATER FLOW, RIVER-INDUCED FLUCTUATIONS, and EVAPOTRANSPIRATION apply digital-computer solutions to previously described mathematical and hydrologic techniques. The GROUNDWATER FLOW program computes the head response in an aquifer to various boundary conditions. The EVAPOTRANSPIRATION program computes the steady-state relation between evapotranspiration and depth to water as a function of thickness and layering of fine-grained material overlying the aquifer. The output from EVAPOTRANSPIRATION is applicable in some problems as boundary criteria in the GROUNDWATER FLOW program. The RIVER-INDUCED FLUCTUATIONS program accepts as input the unit change in stream stage computed by GROUNDWATER FLOW. Using the unit response of the aquifer and a hydrograph of the stream, RIVER-INDUCED FLUCTUATIONS computes the head fluctuations in the aquifer induced by the changes in river stage. (Knapp-USGS)
W74-09115

WATER RESOURCES DATA FOR GEORGIA, 1973.
Geological Survey, Doraville, Ga.
For primary bibliographic entry see Field 7C.
W74-09116

WATER-LEVEL CHANGES IN NORTHWESTERN KANSAS, 1950-73,
Geological Survey, Garden City, Kans.
For primary bibliographic entry see Field 4B.
W74-09194

APPLICATION OF THE GREEN AND COREY METHOD FOR COMPUTING HYDRAULIC CONDUCTIVITY IN HYDROLOGIC MODELING,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 2G.
W74-09195

THE PINE-POPPLE RIVER BASIN--HYDROLOGY OF A WILD RIVER AREA, NORTHEASTERN WISCONSIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 2E.
W74-09223

ANNUAL REPORT ON GROUND WATER IN ARIZONA, SPRING 1972 TO SPRING 1973.
Geological Survey, Phoenix, Ariz.

For primary bibliographic entry see Field 4B.
W74-09229

2G. Water In Soils

THE IMPROVEMENT OF POOR STRUCTURED BASIN DEPRESSION SOILS AT FUDHALIYA EXPERIMENTAL FIELD,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
For primary bibliographic entry see Field 3C.
W74-08763

PENETRABILITY AND HYDRAULIC CONDUCTIVITY OF DILUTE SULFURIC ACID SOLUTIONS IN SELECTED ARIZONA SOILS,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
S. Miyamoto, J. Ryan, and H. L. Bohn.
In: Hydrology and Water Resources in Arizona and the Southwest, Proc. of the 1973 meetings of the Arizona Section-AWRA and the Hydrology Section-Arizona Academy of Science, May 4-5, 1973, Tucson, Arizona, p 55-62, (1973). 6 fig, 2 tab, 12 ref.

Descriptors: *Hydraulic conductivity, *Penetration, *Calcareous soils, *Sodium, Sulfur, Sulfides, Acids, Acid mine water, Soils, Carbonates, Neutralization, Salts, Carbon dioxide, Arizona, Alkali soils.
Identifiers: *Sulfuric acid, Saturation point.

Measurements of penetrability and hydraulic conductivity in calcareous soils treated with a dilute sulfuric acid solution showed a severe decrease in conductivity with increasing concentrations over 1000 ppm. A slight decrease in penetrability was observed. Carbon dioxide evolution appeared to be responsible for flow reduction and temporary cessation at 10,000 ppm and 20,000 ppm. In sodic soils penetrability and conductivity increased markedly with sulfuric acid concentrations between 1,000 and 10,000 ppm. For a neutral soil, penetrability decreased with increasing sulfuric acid concentrations, and the stable conductivity for 500 to 5,000 ppm was higher than for water alone. The findings suggest that disposal of sulfuric acid concentrations greater than 1,000 ppm will result in plugging by carbon dioxide. In sodic soils the possibility exists of using sulfuric acid solutions for reclaiming salt and sodium-affected soils. (Mastic-Arizona)
W74-08765

A JEEP-MOUNTED RAINFALL SIMULATING INFILTROMETER,
Northern Arizona Univ., Flagstaff.
For primary bibliographic entry see Field 7B.
W74-08766

FACTORS AFFECTING THE PERSISTENCE OF PESTICIDES IN THE SOIL,
Rothamsted Experimental Station, Harpenden (England).
For primary bibliographic entry see Field 5B.
W74-08793

INTERACTION EFFECTS OF BORON AND LIME ON BARLEY,
Department of Agriculture, Charlottetown, (Prince Edward Island). Research Station.
For primary bibliographic entry see Field 3F.
W74-08799

EFFECT OF SUPPLEMENTAL WATER ON BARLEY AND CORN PRODUCTION IN A SUB-HUMID REGION,
Agricultural Research Service, Northern Great Plains Research Center. Mandan, N.D.
For primary bibliographic entry see Field 3F.
W74-08803

YIELD RESPONSE OF SOYBEAN VARIETIES GROWN AT TWO SOIL MOISTURE STRESS LEVELS,
Ohio Agricultural Research and Development Center, Wooster.
For primary bibliographic entry see Field 3F.
W74-08805

NITROGEN METABOLISM OF STARGRASS AS AFFECTED BY NITROGEN AND SOIL SALINITY,
Department of Agriculture, Watkinsville, Ga.
For primary bibliographic entry see Field 3C.
W74-08806

IONIC BALANCE FOR BARLEY AS INFLUENCED BY P FERTILITY, WATER, AND SOIL TEMPERATURE,
Agricultural Research Service, Northern Great Plains Research Center. Mandan, N. Dak.
For primary bibliographic entry see Field 3F.
W74-08810

WATER STRESS RELATIONS OF THE POTATO PLANT UNDER FIELD CONDITIONS,
Agricultural Research Service, Orono, Maine.
For primary bibliographic entry see Field 3F.
W74-08811

COTTON LEAF TEMPERATURES AS RELATED TO SOIL WATER DEPLETION AND METEOROLOGICAL FACTORS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 3F.
W74-08812

EFFECT OF LONG-TERM MANAGEMENT ON PHYSICAL AND CHEMICAL PROPERTIES OF THE COSHOCTON WATERSHED SOILS,
Agricultural Research Service Coshocton, Ohio. North Appalachian Experimental Watershed.
For primary bibliographic entry see Field 4D.
W74-08813

CALCIUM-MAGNESIUM-POTASSIUM EQUILIBRIA IN SOME CALIFORNIA SOILS,
California Univ., Davis. Dept. of Pomology.
R. M. Carlson, and J. R. Buchanan.
Soil Science Society of America Proceedings, Vol 37, No 6, p 851-855, November-December, 1973. 5 fig, 3 tab, 19 ref.

Descriptors: *Salinity, *Ion exchange, Ions, Leaching, Fertilizers, *Potassium, Nutrient removal, Equilibrium, *California, *Calcium, *Magnesium.

Ion exchange equilibria in several soils were studied to seek equilibrium equations that could be used in chromatographic models dealing with movement and distribution of fertilizer potassium in soil profiles. Soil samples were equilibrated with mixtures of CaC12, MgC12, and KC1 solutions and then extracted with NH4OAc to determine exchangeable cation compositions at equilibrium. It was necessary to correct the exchangeable cation concentrations by subtracting the cations extracted from nonexchangeable sources by NH4OAc. Vanselow's, Davis', Gapon's or Kerr's equation would not describe the equilibria. Equations were developed to describe the equilibria. (Skogerboe-Colorado State)
W74-08814

FURTHER EVIDENCE FOR THE INABILITY OF THE KJELDAHL TOTAL NITROGEN METHOD TO FULLY MEASURE INDIGENOUS FIXED AMMONIUM NITROGEN IN SUBSOILS,
Nebraska Univ., Lincoln. Agricultural Experiment Station.
V. W. Meints, and G. A. Peterson.
Soil Science Society of America Proceedings, Vol 36, No 3, p 434-436, May-June, 1972. 2 tab, 6 ref.

Descriptors: *Fertility, *Nutrients, *Nitrogen, *Soil chemical properties, Subsoil, Nitrates.
Identifiers: *Ammonium-nitrogen.

Three methods of Kjeldahl total N determinations in soils were compared. Method 1 involved a pretreatment of the soil with a HF-acid mixture and resulted in higher N values than methods 2 or 3 which involved a long period of digestion and a modification of a Gunning method, respectively. Differences in total N values obtained by the three methods were greatest for subsoils. The inability of methods 2 and 3 to measure all of the indigenous fixed ammonium-nitrogen resulted in low N values and erroneously high C:N ratios in the subsoil. (Skogerboe-Colorado State)
W74-08819

AVAILABLE PHOSPHORUS LEVEL VARIATIONS OCCURRING DURING THE RECLAMATION OF AN ALKALINE-SALTY SOIL (VARIACTIONES DEL TENOR DE FOSFORO ASIMILABLE DURANTE LA RECUPERACION DE UN SUELO SALINO-ALCALINO),
Estacion Experimental de Riego y Cultivos, Viedma (Argentina). Tecnico en Fertilidad de Suelos.
R. S. Lavado.
Anales do la Sociedad Cientifica Argentina, Vol 5, No 195, 2nd Series Applied Science, No 33, p 135-141, March-June, 1973. 4 fig, 2 tab, 11 ref.

Descriptors: *Phosphorus, *Soils, *Saline soils, *Alkaline soils, Calcium sulfate, *Flooding, Gypsum.
Identifiers: *Argentina(Rio Negro).

The evolution of available phosphorus in a salty-alkaline soil of the Lower Valley of the Rio Negro was investigated. In general, flooding is thought to cause an increase of the available phosphorus in the soil. Calcium sulfate also seems to increase the availability of pshosphorus. Soil was flooded several times with big sheets of water after applying gypsum. The results show that, statistically, there were no significant variations in the amount of available phosphorus. (Merritt-FIRL)
W74-08822

SOIL CRUSTING RELATED TO SPRINKLER INTENSITY,
Auburn Univ., Ala. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W74-08844

CONTROLLED INSTANTANEOUS APPLICATION OF FREE WATER TO A POROUS SURFACE,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
S. D. Swartzendruber, and M. S. Asseed.
Soil Science Society of America Proceedings, Vol 37, No 6, p 967-968, November-December, 1973. 1 fig. OWRR B-014-IND(7).

Descriptors: *Porous media, *Infiltration, Seepage, *Flow measurement, Control systems, Pressure head.
Identifiers: Water application.

Instantaneous application of free water to a porous-medium surface is achieved essentially by a device in which the central feature is a plastic plate perforated with small holes. The pressure head of the water can be controlled at a preselected value between 0 and 1 cm. Water enters the porous medium at essentially zero external flow resistance, while volume and time of entry can be measured accurately. No lateral flow of free water occurs, thus eliminating the disturbing effects of such flow on the porous-medium surface. (Sandoski-Franklin)
W74-08883

GE(LI) LOW LEVEL IN SITU GAMMA-RAY SPECTROMETER APPLICATIONS,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5A.
W74-08886

THE EFFECT OF EXCLUSION VOLUME ON POTENTIOMETRIC NITRATE MEASUREMENT,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
J. T. Gilmour, and H. D. Scott.
Soil Science Society of America Proceedings, Vol 37, No 6, p 959-960, November-December, 1973. 1 fig, 2 tab, 10 ref.

Descriptors: *Nitrates, Nitrogen, *Clays, *Montmorillonite, Measurement, *Soils.
Identifiers: *Potentiometric measurement.

Data are presented which show that large anion exclusion volumes can occur when montmorillonitic soils, low in total salt, are extracted with water. Nitrate measurements on such extracts with the nitrate specific ion electrode reflect this exclusion volume induced error. A possible solution to the problem is suggested. (Skogerboe-Colorado State)
W74-08919

INTERACTING DIFFUSE LAYERS IN MIXED MONO-DIVALENT IONIC SYSTEMS,
Volcani Inst. of Agricultural Research, Bet Dagan (Israel).
E. Bresler.
Soil Science Society of America Proceedings, Vol 36, No 6, p 891-896, November-December, 1972. 7 fig, 1 tab, 19 ref.

Descriptors: *Cation exchange, *Cations, Analog computers, Computer models, *Ion exchange, Soils, Clays.

A numerical solution of the electric double-layer problem for the case of overlapping diffuse layers in mixed monovalent-divalent ion systems, is used to obtain a series of graphs for various cation compositions in the external solution. In these graphs, the electric potential is expressed as a function of the surface charge density, the concentration of the two cations in the equilibrium solution, and the distance between platelets in various ionic mixtures. The graphs cover most of the situations usually encountered in soil systems, and are not sensitive to the valency of the anions present. They are used to estimate the electrostatic effect on cation exchange equilibria, swelling pressures, and electrokinetic phenomena in mixed-ion clay systems. Application of these estimates to theoretical analyses and comparisons between theoretical models and experimental data are illustrated. Some of the examples used for this illustration are based on work previously published by others. (Skogerboe-Colorado State)
W74-08920

WASTE ACCUMULATION ON A SELECTED DAIRY CORRAL AND ITS EFFECT ON THE NITRATE AND SALT OF THE UNDERLYING SOIL STRATA,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W74-08921

SOLUTION AND ADSORBED FLUOMETURON CONCENTRATION DISTRIBUTION IN A WATER-SATURATED SOIL: EXPERIMENTAL AND PREDICTED EVALUATION,
Environmental Protection Agency, Ada, Okl.
A. G. Hornsby, and J. M. Davidson.
Soil Science Society of America Proceedings, Vol 37, No 6, p 823-828, November-December, 1973. 7 fig, 2 tab, 12 ref.

Descriptors: *Adsorption, Solutes, *Soil water, Soil moisture, Salinity, Measurement, Mathematical models.
Identifiers: *Desorption, Miscible displacement, Dispersion coefficient, *Solute transport model, *Fluometron.

A technique is described for measuring the solution and adsorbed phases of fluometuron in water-saturated soil columns. The data reveal that at an average pore-water velocity of 5.5 cm/hour, the solution and adsorbed phases of fluometuron are not in equilibrium, whereas, at the 0.59 cm/hour velocity they were in equilibrium. The kinetic rate equations for adsorption and desorption were not significantly better than the equilibrium model when describing the fast displacement of fluometuron through soils. The desorption distribution coefficient was found to be a function of the maximum amount of herbicide adsorbed prior to desorption. The experimental data were reasonably well described by the mathematical model. (Skogerboe-Colorado State)
W74-08924

EVALUATION OF GRADED FURROW IRRIGATION WITH LENGTH OF RUN ON A CLAY LOAM SOIL,
Agricultural Research Services, Bushland, Tex. Southwestern Great Plains Research Center.
For primary bibliographic entry see Field 3F.
W74-08927

DYNAMIC SIMULATION OF AUTOMATED SUBSURFACE IRRIGATION SYSTEMS,
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
For primary bibliographic entry see Field 3F.
W74-08931

FURROW IRRIGATION CRITERIA FOR HAWAIIAN SUGARCANE,
Hawaiian Sugar Planters' Association Experiment Station, Honolulu.
For primary bibliographic entry see Field 3F.
W74-08932

SUITABILITY OF NEW MEXICO LANDS FOR IRRIGATION,
New Mexico State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-09055

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, MCKINLEY COUNTY,
New Mexico State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-09056

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, VALENCIA COUNTY,
New Mexico State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-09057

APPLICATION OF THE GREEN AND COREY METHOD FOR COMPUTING HYDRAULIC CONDUCTIVITY IN HYDROLOGIC MODELING,
Oak Ridge National Lab., Tenn.
R. J. Luxmoore.
Available from NTIS, Springfield, Va. 22151 as EDFB-IBP-73-4 Price $3.00 printed copy; $1.45 microfiche. International Biological Program Report EDFB-IBP-73-4, April 1973. 22 p, 11 ref, append.

Descriptors: *Hydraulic conductivity, *Soil water movement, *Computer programs, Saturated flow, Unsaturated flow.

The Green and Corey method for computing the relationship of hydraulic conductivity and soil water content was implemented as a subroutine (SOIL) and coupled with a table lookup subroutine (TABLOK) for use in soil-water modeling at several sites in the Eastern Deciduous Forest Biome. Readily available input data (water content vs pressure, saturated conductivity) are used in the SOIL subroutine to compute unsaturated conductivity. Three data arrays (water content, pressure, conductivity) are set up in SOIL and used in TABLOK such that at a given value of soil-water content the corresponding values for pressure and conductivity are calculated by linear interpolation. Outlines of the computational methods and program listings are given together with example calculations. Two modified methods for calculating conductivity are compared with the Green and Corey method. One modification uses an unsaturated conductivity matching value. The other uses a linearly weighted matching factor, based on both saturated and unsaturated conductivity values. Any one of the three methods can be used in the SOIL-TABLOK subroutines. The package can provide an effective bridge between available data and the input data requirements of a physically based soil-water model. (Knapp-USGS)
W74-09195

SEISMIC REFRACTION ANALYSIS OF WATERSHED MANTLE RELATED TO SOIL, GEOLOGY, AND HYDROLOGY,
Forest Service (USDA), Rapid City, S. Dak. Rocky Mountain Forest and Range Experiment Station.
T. Yamamoto.
Water Resources Bulletin, Vol 10, No 3, p 531-546, June 1974. 8 fig, 3 tab, 15 ref.

Descriptors: *Seismic studies, *Soil water movement, *Rainfall-runoff relationships, *Hydrogeology, Water balance, Alpine, Infiltration, Data collections, Geophysics, Sampling, Subsurface investigations, Hydrograph analysis, Cores, Duration curves, *South Dakota.

A seismic refraction survey was carried out in three contiguous watersheds (217, 89, and 190 acres) on a laccolith near Sturgis, South Dakota. Isopachs, area-elevation curves (hyposmetry), and structure contours were used together with drill cores, petrography, hydrographs, and soil information to interpret the nature and role of porous mantle in the behavior of the watersheds. Refraction profiles produced only one geologically meaningful seismic contrast within the laccolith. Drill cores indicated a shallow stony profile on a sheeted horizon terminating on isotropic crystalline rock impervious except for tight joints. Refraction and core interpretations were not statistically different. Apparent seismic discontinuities deeper within the bedrock lacked geological identity. Storm hydrographs and water yields are better related to soil type differences and porous mantle distribution than to average porous mantle depth. Slopes of flow-duration curves correlate with average porous mantle depth. Porous mantle isopachs, hypsometry, and soil type delineation are complimentary in interpretation of watershed behavior. (Knapp-USGS)
W74-09199

PARTIAL AREA HYDROLOGY AND ITS APPLICATION TO WATER RESOURCES,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
For primary bibliographic entry see Field 2A.
W74-09200

SOIL RESPIRATION IN DIFFERENT TYPES OF SOUTHEAST ASIAN TROPICAL RAIN FOREST, (IN GERMAN),
Zurich Univ. (Switzerland). Institut fuer Allgemeine Botanik.
H. Wanner, S. Soerohaldoko, P. D. Natalia, G. Panggabean, and P. Yingchoi.
Oecologia (Berl). Vol 12, No 3, p 289-302, 1973. (English summary).
Identifiers: Forests, Precipitation(Atmospheric), *Soil respiration, Teak, Tropical rain forests, *Asia(Southeast).

Soil respiration was measured in different types of rain forest in West, South, and East Java and in Sarawak, North Borneo. The altitude of the experimental sites varied from sea level to 1500 m. In keeping with the different amounts and distribution of precipitation during the year, and due to the very different soil types, vegetation varied from lowland to montane rain forest, teak forest, monsoon forest and heath forest. In all these forest types soil respiration values were of the same order of magnitude. They indicate an oxidation of 10-13 tons organic matter/ha/yr. In some of the experimental sites soil respiration was measured during the rainy as well as during the dry season. The values obtained justify extrapolation to a yearly average. The difficulties connected with interpretation of the soil respiration values as equivalent to net production of the different forest types were discussed.--Copyright 1974, Biological Abstracts, Inc.
W74-09246

WATER LOSS FROM AN IRRIGATED SORGHUM FIELD: I. WATER FLUX WITHIN AND BELOW THE ROOT ZONE,
South Dakota State Univ., Brookings. Dept. of Plant Science.
For primary bibliographic entry see Field 3F.
W74-09248

2H. Lakes

EFFECTS OF ICE FORMATION ON THE SALT REGIME OF A RESERVOIR (VLIYANIYE LEDOOBRAZOVANIYA NA SOLEVOY REZHIM VODOKHRANILISHCHA),
Vsesoyuznyi Nauchno-Issledovatel skii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenerno Gidrogeologii, Moscow (USSR).
For primary bibliographic entry see Field 2C.
W74-08704

LACUSTRINE SALT DEPOSITS UNDER PRESENT-DAY SEDIMENTS OF THE ARAL SEA (SOLYANYYE OZERNYYE OTLOZHENIYA POD SOVREMENNYMI OSADKAMI ARAL'SKOGO MORYA),
Akademiya Nauk Uzekskoi SSR, Tashkent. Institut Geologii i Geofiziki.
I. V. Rubanov.
Uzbekskiy Geologicheskiy Zhurnal, No 1, p 73-76, 1974. 1 fig, 1 tab, 4 ref.

Descriptors: *Lakes, *Saline lakes, *Salts, *Lake sediments, Bottom sediments, Marl, Silts, Clays, Sands, Maps.
Identifiers: *USSR(Aral Sea).

The Aral Sea is a comparatively shallow-water basin. Mean depth is 15-20 m, and maximum depth is 62 m near the western shore. Maximum length from southwest to northeast is 428 km, and maximum width from west to east is 284 km. Marl, which occupies the central part and western deep-sea areas is predominant among bottom sediments of the sea. Silts, sands, and clays are less developed. The presence of water-soluble salts among the marine sediments attests to complete disappearance of the sea at the time and to transformation of the sea into small dry saline lakes. The Aral Sea was formed 700-1,000 years ago, which is confirmed by data on rate of accumulation of muds above the saline deposits (0.7-0.8 mm/yr). By analogy with the structure of present-day saline lakes in Soviet Central Asia it may be assumed that the thickness of the mirabilite layer under bottom sediments of the sea will be of the order of 1 m. Areas of major buried salt deposits probably reach 1,000 sq km. (Josefson-USGS)
W74-08712

MAN-MADE LAKES: THEIR PROBLEMS AND ENVIRONMENTAL EFFECTS,
For primary bibliographic entry see Field 4A.
W74-08747

LAKE MEAD, A CASE HISTORY,
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 4A.
W74-08748

SEEPAGE LOSSES FROM LAKE NASSER,
High Dam Authority, Cairo (Egypt).
For primary bibliographic entry see Field 4A.
W74-08750

ECOSYSTEM OF THE SALTON SEA,
California State Univ., Long Beach. Dept. of Microbiology.
For primary bibliographic entry see Field 4A.
W74-08752

LIGHT AND TEMPERATURE RELATIONS IN A SMALL DESERT POND AS INFLUENCED BY PHYTOPLANKTONIC DENSITY VARIATIONS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5C.
W74-08758

SEASONAL CHANGES OF THE FEEDING OF THE ROACH IN THE MOZHAISK RESERVOIR (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Ichthyology.
E. A. Zadorozhnaya.
Biol Nauki, Vol 15, No 9, p 31-34, 1972. Illus.
Identifiers: Algae, Detritus, Insect larvae, Plankton, Reservoirs, *Roach, Rutilus-rutilus, *Seasonal, *USSR(Mozhaisk reservoir), Zooplankton, Fish diets.

An investigation of the seasonal change of feeding of the roach (Rutilus rutilus) at age 4-11 yr in the Mozhaisk reservoir (USSR) showed that in the spring and early summer macrophytes, plant detritus, algae, and insect larvae predominated in the food of the roach and during the summer-fall and winter periods zooplankton of the pelagic zone predominated. The general direction in the seasonal change of feeding consisted in a decrease of aquatic vegetation and benthic food objects from spring to summer and a change to feeding on limnoplankton in the summer-fall period.--Copyright 1973, Biological Abstracts, Inc.
W74-08762

LAKE POWELL RESEARCH PROJECT: HYDROLOGIC RESEARCH,
California Univ., Los Angeles. Inst. of Geophysics.
G. C. Jacoby.
In: Hydrology and Water Resources in Arizona and the Southwest, Proc. of the 1973 meetings of the Arizona Section, AWRA, and the Hydrology Section-Arizona Academy of Science, May 4-5, 1973, Tucson, Arizona, p 119-123, (1973).

Descriptors: Hydrology, *Limnology, *Geochemistry, *Streamflow, Evaporation, Bank storage, Sedimentation, Dendrochronology, Colorado River, *Arizona, *Nevada, Data collections.
Identifiers: *Lake Powell.

Two administrative institutions, the University of California at Los Angeles and Dartmouth College, are undertaking several subprojects designed to investigate the hydrology of the Lake Powell region. The subprojects include studies of streamflow trends, evaporation, bank storage, sedimentation, physical limnology, and lake geochemistry. The project is concluding its first year of full-scale research. The first year of research has been devoted to setting up data collection systems and some tentative conclusions have been reached. More specific results will be furnished in the second year, particularly in regard to water budget and limnology of Lake Powell. (Mastic-Arizona)
W74-08767

PHOSPHORUS AND CARBON IN LAKE POLLUTION,
Basf-Wyandotte Chemical Corp., Mich.
For primary bibliographic entry see Field 5C.
W74-08775

COMPREHENSIVE MANAGEMENT OF PHOSPHORUS WATER POLLUTION,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5C.
W74-08826

VERTICAL DISTRIBUTION OF MICROBIAL PLANKTON IN SOUTHERN PART OF LAKE BAIKAL IN 1969, (IN RUSSIAN),
Biologo-Geograficheskii Nauchno-Issledovatelskii Institut, Irkutsk (USSR).
For primary bibliographic entry see Field 5C.
W74-08870

DISTRIBUTION OF PHOSPHATES IN LAKE MARIUT, A HEAVILY POLLUTED LAKE IN EGYPT,
Alexandria Univ. (Egypt). Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W74-08881

DISTRIBUTION OF SELECTED TRACE METALS IN SOUTHERN LAKE MICHIGAN AND LOWER GREEN BAY,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-08934

A STUDY OF THE EUTROPHICATION OF THE SURFACE WATERS OF PYRAMID LAKE,
Nevada Univ., Reno. Dept. of Chemical and Metallurgical Engineering.
For primary bibliographic entry see Field 5C.
W74-08938

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF NINE MILE POINT NUCLEAR STATION UNIT 1.
Directorate of Licensing (AEC), Washington, D.C.
Aval: NTIS, Springfield, Va., as Rept. No. Docket 50220-227; $10.60/copy, $1.45 microfiche. Report No. Docket 50220-227, January 1974. 471 p, 36 fig, 44 tab, 108 ref, 3 append.

Descriptors: *Lake Ontario, *Nuclear powerplants, Effluents, Environment, Administrative agencies, Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *New York.
Identifiers: *Environmental Impact Statement, *Boiling water reactors.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed conversion of the current provisional operating license to a full-term license for the Nine Mile Point Nuclear Station Unit 1. The plant is located on Lake Ontario in the state of New York and will employ a boiling-water reactor cooled by once-through flow of water obtained from and discharged to Lake Ontario. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to convert the current provisional operating license to a full-term license for the facility subject to the following conditions: (1) construct a new radwaste facility; (2) establish a revised and comprehensive environmental monitoring program; (3) provide an analysis and course of action for any evidence for potential irreversible damage detected. (Houser-ORNL)
W74-08960

THE DISTRIBUTION OF COBALT-60 RUTHENIUM-106 AND CESIUM-137 AMONG SUSPENDED AND DISSOLVED PARTICLES IN WHITE OAK LAKE,
Oak Ridge Gaseous Diffusion Plant, Tenn.
For primary bibliographic entry see Field 5B.
W74-08964

PROTOCOL FOR EVALUATING THE NITROGEN STATUS OF LAKE SEDIMENTS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5C.
W74-09065

DAILY VERTICAL DISTRIBUTION OF WINTER ZOOPLANKTON IN THE PELAGIC ZONE OF LAKE BAIKAL, (IN RUSSIAN),
Kaliningradskii Teckhnicheskii Institut Rybnoi Promyshlennosti i Khozyaistva (USSR).
For primary bibliographic entry see Field 5C.
W74-09074

PROBLEMS OF THE REGIME AND INVESTIGATION OF LAKES AND RESERVOIRS (VOPROSY REZHIMA I ISSLEDOVANIYA OZER I VODOKHRANILISHCH),
Gosudarstvennyi Gidrologicheskii Institut, Lenigrad (USSR).
Gosudarstvennyi Gidrologicheskii Institut Trudy, No 203, Znamenskiy, V. A., editor, Leningrad, 1973. 268 p.

Descriptors: *Lakes, *Reservoirs, *Water balance, *Hydrologic cycle, *Currents(Water), Flow, Precipitation(Atmospheric), Discharge(Water), Runoff, Evaporation, Stratification, Thermal properties, Circulation, Waves(Water), Winds, Water levels, Floats, Current meters, Statistical methods, Mapping.
Identifiers: *USSR, *Lake Baykal, Water exhange, Meromictic lakes, Metalimnion, Longshore currents, Gradient currents, Drift currents, Geostrophic currents, Spectrum analysis.

Hydrologic regimes of large bodies of water are discussed in this collection of 14 papers prepared by the Department of Lakes and Reservoirs of the State Hydrologic Institute and by lake hydrometeorological observatories, and stations. Subjects discussed include: (1) water balance of Lake Baykal; (2) refinement of the precipitation amount as applied to calculation of water balance of Lake Baykal; (3) on-site investigations of currents in the southern part of Lake Baykal; (4) internal water exchange and turbulence in Lake Baykal; (5) application of a dynamic height method to investigations of currents in inland bodies of water; (6) long-term characteristics of the temperature regime of Lake Ladoga; (7) depth distribution of water temperature in the Kakhovka Reservoir; (8) thermal characteristics and vertical exhange in meromictic lakes as illustrated by Lake Gek-Gel'; (9) comparative estimation of energy losses in water bodies and in tranquil and turbulent flows; (10) statistical and spectrum analyses of wind waves on the Kayrakkum Reservoir; (11) aircraft determinations of wind velocity and direction above a water surface; (12) techniques of ship measurement of currents by current meters and floats; (13) volume of water in rivers, lakes, and reservoirs of the Soviet Union; and (14) water balance of world lakes and reservoirs. (See W74-09101 thru W74-09112) (Josefson-USGS)
W74-09100

WATER BALANCE OF LAKE BAYKAL (VODNYY BALANS OZ. BAYKAL),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
Z. A. Vikulina, and T. D. Kashinova.
In: Voprosy rezhima i issledovaniya ozer i vodokhranilishch; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 203, p 3-33, Leningrad, 1973. 1 fig, 22 tab, 15 ref.

Descriptors: *Lakes, *Water balance, *Hydrologic cycle, Inflow, Precipitation(Atmospheric), Discharge(Water), Runoff, Evaporation, Water levels, Water level fluctuations, Lake basins, Watersheds(Basins).
Identifiers: *USSR(Lake Baykal).

Water balance of Lake Baykal was refined on the basis of recent observations and calculations. A comparison of data on items in the water balance of the lake for a 70-year period (1901-70) and for the last 38 years (1933-70) shows that variations in surface inflow, lake runoff, and lake level fluctuations do not exceed 2%-5%. Maximum differences occur in determination of evaporation and precipitation values, which, according to calculations by the State Hydrologic Institute on data from 1933-70, increased by more than 40% over those obtained by earlier investigators. The volume of water actually participating in the hydrologic cycle of the lake is 73 cu km as compared with 70 cu km established earlier. Nonuniform inflow and discharge of water in different parts of the lake contribute to intensified circulation of water masses. The annual volume of water flowing from the northern part of the lake to the southern part through the Selenga shoals is 36 cu km. (See also W74-09100) (Josefson-USGS)
W74-09101

REFINEMENT OF THE PRECIPITATION AMOUNT AS APPLIED TO CALCULATION OF WATER BALANCE OF LAKE BAYKAL, (UTOCHNENIYE VELICHINY OSADKOV PRIMENITEL'NO K RASCHETU VODNOGO BALANSA OZ. BAYKAL),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
A. A. Natrus, and I. A. Mukhacheva.
In: Voprosy rezhima i issledovaniya ozer i vodokhranilishch; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 203, p 34-48, Leningrad, 1973. 1 fig, 9 tab, 26 ref.

Descriptors: *Lakes, *Water balance, *Precipitation(Atmospheric), Precipitation gages, Rain gages, Gaging stations, Winds, Evaporation, Mapping, Isohyets.
Identifiers: *USSR(Lake Baykal), Tret'yakov precipitation gages.

Assessment of precipitation is very important in determining its role in the water balance of Lake Baykal. A number of corrections must be applied to precipitation-gage readings to assess the amount of precipitation on the water surface. The most important corrections to be applied are those of the effect of wind on the instruments, precipitation losses to wetting of the precipitation gage (bucket), and precipitation losses to evaporation from the bucket. To obtain a uniform long-term precipitation evaluation, a correction must be allowed for reducing the precipitation amounts measured by rain gages standing 2 m high and surrounded by a shield to the precipitation amounts measured by Tret'yakov precipitation gages. As compared with earlier calculations, refinement of the precipitation amount for Lake Baykal was 100 mm, i.e., 25% of the long-term average. (See also W74-09100) (Josefson-USGS)
W74-09102

RESULTS OF ON-SITE INVESTIGATIONS OF CURRENTS IN THE SOUTHERN PART OF LAKE BAYKAL (REZUL'TATY NATURNYKH ISSLEDOVANIY TECHENIY V YUZHNOM BAYKALE),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
M. M. Aynbund.
In: Voprosy rezhima i issledovaniya ozer i vodokhranilisch; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 203, p 49-70, Leningrad, 1973. 7 fig, 10 tab, 11 ref.

Descriptors: *Lakes, *Currents(Water), *On-site investigations, Mapping, Water circulation, Movement, Velocity, Rates, Winds, Ice cover, Flow measurement, Current meters, Floats, Buoys, Seasonal.
Identifiers: *USSR(Lake Baykal), Longshore currents.

Currents in the southern part of Lake Baykal were measured in 1965-67 during the ice-free season and during the period of complete ice cover. The major factor in the formation of currents in the southern part of the lake during the ice-free season is that of wind. The effects of other factors are negligible. The stability of prevailing currents varies throughout the lake and increases from summer to fall. Average current velocities in the southern part of the lake during the navigation period vary between 12 and 18 cm/sec at a depth of 15 m and between 4 and 8 cm/sec at a depth of 50 m. Current velocity generally increases significantly from summer to fall. Influence of the bank manifests itself in the 1-1.5 km-wide littoral zone and is reflected in lower (by a factor of 2-2.5) velocities of longshore currents and in formation of eddies of varying types and sizes. As a result, transport is considerably less in the littoral zone than at a distance of 1.5-3 km from the bank. A prevailing cyclonic cycle formed before start of complete ice cover is retained in upper layers under the ice. Current velocities in winter are negligible in all regions in the southern part of the lake. Local circulations and eddies produced by turbulence are strongly developed in deep layers (900-1,200 m) during complete ice cover. (See also W74-09100) (Josefson-USGS)
W74-09103

PROBLEM OF THE PROCESSES OF INTERNAL WATER EXCHANGE AND TURBULENCE IN LAKE BAYKAL (K VOPROSU O PROTSESSAKH VNUTRENNEGO VODOOBMENA I TURBULENTNOSTI NA OZ. BAYKAL),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
V. A. Znamenskiy.
In: Voprosy rezhima i issledovaniya ozer i vodokhranilishch; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 203, p 71-79, Leningrad, 1973. 4 fig, 2 tab, 5 ref.

Descriptors: *Lakes, *Turbulence, *Water circulation, Movement, *Water chemistry, Mixing, Eddies, Dissolved solids, Littoral, Surveys, Mapping, Equations.
Identifiers: *USSR(Lake Baykal), *USSR(Selenga River), *Water exchange, Mineralization.

Internal exchange of water between individual parts of the lake, character of turbulence in the littoral zone, and distribution of waters of the Selenga River were investigated in hydrochemical surveys in the southern part of Lake Baykal in 1967-69. The surveys were performed by an expedition of the Hydrochemical Institute of the Main Administration of the Hydrometeorological Service (GUGMS) and were conducted at the surface, mid-depth, and bottom of the lake. Large-scale turbulent eddies governing the mixing and transport of water masses and dissolved chemical and organic substances were found to exist in the littoral zone of the lake. (See also W74-09100) (Josefson-USGS)
W74-09104

A DYNAMIC METHOD AND ITS APPLICATION TO INVESTIGATIONS OF CURRENTS IN INLAND BODIES OF WATER (DINAMICHESKIY METOD I YEGO PRIMENENIYE DLYA ISSLEDOVANIY TECHENIY VO VNUTRENNIKH VODOYEMAKH),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
T. V. Rotatova, and T. N. Filatova.
In: Voprosy rezhima i issledovaniya ozer i vodokhranilishch; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 203, p 80-124, Leningrad, 1973. 15 fig, 9 tab, 40 ref.

Descriptors: *Stage-discharge relations, *Inland waterways, *Lakes, *Currents(Water), Bodies of water, Density currents, Height, Depth, Circulation, Water circulation, Air circulation, Velocity, Wind velocity, Winds, Current meters, Water quality, Meteorology, Temperature, Isotherms, Mapping, Equations.
Identifiers: *USSR, *Dynamic height method, Gradient currents, Drift currents, Wind currents, Geostrophic currents, Convective currents.

Possibilities of the dynamic height method for investigation of currents in inland bodies of water are limited by (1) absence of generally accepted concepts of types of currents that can be calculated by this method and (2) absence of sufficiently complete studies summarizing its adaptation to freshwater conditions. Fundamentals of the dynamic method are discussed; possibility of its application to investigation of currents in inland freshwater bodies is considered; computed and observed characteristics of currents are compared; and concepts of the types of currents calculated by the dynamic method are refined. The method is applied to Lakes Ladoga, Issyk-Kul' and Baykal in the Soviet Union, Lakes Huron and Michigan in the United States, Lake Constance (Bodensee) on the border between Germany, Austria, and Switzerland, and Lake Ohrid in southern Yugoslavia and eastern Albania. (See also W74-09100) (Josefson-USGS)
W74-09105

LONG-TERM CHARACTERISTICS OF THE TEMPERATURE REGIME OF LAKE LADOGA (MNOGOLETNIYE KHARAKTERISTIKI TEMPERATURNOGO REZHIMA LADOZHSKOGO OZERA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
V. A. Misyuk.
In: Voprosy rezhima i issledovaniya ozer i vodokhranilishch; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 203, p 125-147, Leningrad, 1973. 8 fig, 8 tab, 5 ref, append.

Descriptors: *Lakes, *Thermal properties, *Water temperature, Thermocline, Heat, Heating, Cooling, Shallow water, Deep water, Depth, Littoral, Isotherms, Mapping, Seasonal.
Identifiers: *USSR(Lake Ladoga).

The close relation which exists between surface water temperature in the open part of a lake and temperature recorded by gaging stations can be used to determine 10-day and monthly water temperatures for littoral, intermediate, and deep-water zones as well as for the entire lake. Isotherms, constructed in 1963-70 at different depths during the second phase of spring warming, the summer period, and the first phase of autumnal cooling, give a graphic picture of the distribution of water masses of Lake Ladoga and show that warmest waters are in the southeastern region and that coldest waters are in northern and northwestern regions. The maximum depth of wind mixing is 30 m. At the start of spring warming the thermocline occurs only in the southern shallow-water zone. Cold waters having a temperature of about 4 deg C or less are located at this time in middle and northern parts of the lake. With additional entry of heat into the lake the thermocline in the southern part descends and forms in middle and northern parts of the lake. Maximum temperature gradients are observed in July-August in the upper layers of water to a depth of 10 m. Advection of cold northern water masses into the southern shallow-water part of the lake occurs in July-September. Storage of heat in the lake is calculated, and recommendations call for additional studies of the lake's thermal regime. (See also W74-09100) (Josefson-USGS)
W74-09106

DEPTH DISTRIBUTION OF WATER TEMPERATURE IN THE KAKHOVKA RESERVOIR (RASPREDELENIYE TEMPERATURY VODY PO GLUBINE V KAKHOVSKOM VODOKHRANILISHCHE),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
V. M. Klaven.
In: Voprosy rezhima i issledovaniya ozer i vodokhranilishch; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 203, p 148-160, Leningrad, 1973. 5 fig, 2 tab, 5 ref.

Descriptors: *Reservoirs, *Water temperature, *Depth, *Distribution, Air temperature, Wind velocity, Thermal stratification, Summer, Fluctuations, Cross sections.
Identifiers: *USSR(Kakhovka Reservoir).

Characteristics of the thermal regime of the Kakhovka Reservoir in southeastern Urkaine were investigated in May-August 1970-71. Water temperature in a surface layer in deep water and in a littoral zone in an area of measurement differs only slightly. The range of daily fluctuations in a surface layer during summer months is 1-2 deg C, and only on individual hot days does it reach 6-8 deg C. The difference between surface and bottom water temperatures at the temperature station and at sections across the reservoir is 0.1-0.5 deg C on stormy days but reaches 5-7 deg C on calm, hot days. Four characteristic types of depth distribution of water temperature are identified: (I) isothermal conditions with a temperature difference between surface and bottom layers, not exceeding 0.5 deg C; (II) a smooth temperature drop from surface to bottom, ranging from 0.5 to 1.5 deg C; (III) a sharp temperature drop from the surface to a depth of 1.5-4.0 m, ranging from 1.5 to 7.0 deg C; and (IV) presence of three expressed layers: the epilimnion, metalimnion, and hypolimnion. The temperature difference between surface and bottom layers is 1.5-5.0 deg C. Isothermal conditions (type I) prevail during most (73%) of the summer season. Type III stratification during summer months is more frequent (14%) than type IV stratification (5%), while the duration of type II stratification occupies a middle position (8%). (See also W74-09100) (Josefson-USGS)
W74-09107

THERMAL CHARACTERISTICS AND VERTICAL EXCHANGE IN MEROMICTIC LAKES AS ILLUSTRATED BY LAKE GEK-GEL' (TERMICHESKIYE OSOBENNOSTI I VERTIKAL'NYY OBMEN V MEROMIKTICHESKIKH OZERAKH NA PRIMERE OZ. GEK-GEL'),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
T. N. Filatova, and M. A. Fortunatov.
In: Voprosy rezhima i issledovaniya ozer i vodokhranilishch; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 203, p 161-185, Leningrad, 1973. 6 fig, 5 tab, 57 ref.

Descriptors: *Lakes, *Meromixis, *Water circulation, *Thermal properties, Water temperature, Thermal stratification, Thermocline, Thermal conductivity, Convection, Turnovers, Seasonal, Mixing, Mixolimnion, Epilimnion, Hypolimnion, Probability, Curves, Equations.
Identifiers: *USSR(Lake Gek-Gel'), *Meromictic lakes, Metalimnion, Monimolimnion, Thermoisopleths.

Lake Gek-Gel' is located in Azerbaydzhan, 30 km south of Kirovabad, at a height of 1,650 m above sea level on slopes of the Morov-Dag mountain range. The area of the lake is 0.79 sq km; length is 2.5 km; and maximum width is 0.5 km. Maximum depth, which is about 100 m, occurs in the middle part of the lake. The shape of the lake basin is conical. Distribution of water temperature on the lake surface is similar to that on the surface of lakes in temperate latitudes. The water layer of the mixolimnion of the lake in May-November is divided into the epilimnion, metalimnion, and hypolimnion. The metalimnion is the most clearly expressed. Maximum temperature gradients in it are observed in July and reach 5 deg/m or more. In July-August the probability of vertical temperature gradients of about 1 deg/m is 99%, that of 2 deg/m--50% and that of 5 deg/m or more--1%. A stable temperature approaching 5 deg is maintained throughout the year in the monimolimnion located at a depth below 20 m. In July-August vertical exchange in the lake approaches molecular exchange. During other periods of direct stratification, vertical exchange is approximately of the order of 1-2 times higher than molecular exchange. Similarity in vertical distribution of water and in hydrochemical and hydrobiological indices in Lake Gek-Gel' and the Black Sea may be due to similar conditions of vertical exchange in the two bodies of water, although in Lake Gek-Gel' the rate of vertical exchange during the period of sharp stratification is of an order lower than in the Black Sea. Data are presented on the best studied ectogenic, crenogenic, and biogenic meromictic lakes of the world. (See also W74-09100) (Josefson-USGS)
W74-09108

A COMPARATIVE ESTIMATE OF ENERGY LOSSES IN WATER BODIES AND IN TRANQUIL AND TURBULENT FLOWS (SRAVNITEL'NAYA OTSENKA POTER' ENERGII V VODOYEMAKH, SPOKOYNYKH I BURNYKH POTOKAKH),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
V. A. Znamenskiy.
In: Voprosy rezhima i issledovaniya ozer i vodokhranilishch; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 203, p 186-199, Leningrad, 1973. 3 fig, 1 tab, 8 ref.

Descriptors: *Subcritical flow, *Turbulent flow, *Bodies of water, *Energy loss, *Estimating, Fluid mechanics, Hydraulics, Hydraulic gradient, Slopes, Reynolds number, Froude number, Velocity, Viscosity, Turbulence, Chezy equation, Roughness(Hydraulic), Friction, Resistance, Chutes, Bottom sediments.
Identifiers: *USSR.

Problems in estimation of energy losses for different types of flows are considered. Basic indicators are hydraulic gradient, Reynolds and Froude criteria, and relative smoothness of the bottom surface. Analytical expressions are obtained for determining total energy losses and coefficients of

hydraulic friction in water bodies and chutes, where bottom roughness is a static phenomenon. The analytical relations proposed agree with conclusions from Prandtl's semiempirical theory and with results of experimental investigations of kinematic characteristics of the bottom layer. Relations proposed for flows in water bodies can be used to determine mean velocity and coefficients of turbulent exchange. (See also W74-09100) (Josefson-USGS)
W74-09109

STATISTICAL AND SPECTRUM ANALYSES OF WIND WAVES ON THE KAYRAKKUM RESERVOIR (STATISTICHESKIY I SPEKTRAL'NYY ANALIZY VETROVOGO VOLNENIYA NA KAYRAKKUMSKOM VODOKHRANILISHCHE),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
M. I. Krivoshey, and R. B. Kudryashova.
In: Voprosy rezhima i issledovaniya ozer i vodokhranilishch; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 203, p 200-222, Leningrad, 1973. 8 fig, 2 tab, 16 ref.

Descriptors: *Reservoirs, *Waves(Water), *Statistical methods, Correlation analysis, Probability, Wind velocity, Winds, Fetch, Curves, Equations.
Identifiers: *USSR(Kayrakkum Reservoir), *Wind waves, *Spectrum analysis, Pearson distributions, Correlograms.

The Kayrakkum Reservoir, located in the western part of the Fergana valley on the Syr Dar'ya River, was built in 1956. The area of the reservoir is 523 sq km; length is 56 km; maximum width is 15 km; mean depth is 8 m; and maximum depth near the dam is 20-24 m. Statistical and spectrum analyses were made of several recordings of steady wind waves and an analysis was also made of the errors of computation of mean wave heights and periods in deep water of the reservoir. Distribution curves of wave heights and periods conform fairly good to the Pearson Type I distribution. Rayleigh's curve, developed under the assumption of a normal law of distribution of wave ordinates, agrees poorly with empirical data. At wind velocities of 10-15 m/sec the relative error of computation of mean wave heights after the Braslavskiy and spectral methods is practically the same and equals 5%. At a wind velocity of 5 m/sec both methods overestimate wave heights, the Braslavskiy method by 24% and the spectral method by 38%. At a wind velocity of 5 m/sec the Labzovskiy method overestimates wave heights by 68%. At a wind velocity of 10-12 m/sec the error of computation is zero and at a wind velocity of 15 m/sec it is 7%. (See also W74-09100) (Josefson-USGS)
W74-09110

VOLUME OF WATER IN RIVERS, LAKES, AND RESERVOIRS OF THE SOVIET UNION (OB"YEM VODY V REKAKH, OZERAKH I VODOKHRANILISHCHAKH SOVETSKOGO SOYUZA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
R. A. Nezhikhovskiy.
In: Voprosy rezhima i issledovaniya ozer i vodokhranilishch; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 203, p 239-247, Leningrad, 1973. 1 fig, 6 tab, 10 ref.

Descriptors: *Water, *Rivers, *Lakes, *Reservoirs, *Volume, Discharge(Water), Equations.
Identifiers: *USSR.

The number of rivers in the Soviet Union is 2,963,397, and their total length is 9,647,864 km. The total volume of water in the rivers is 504 cu km. The number of lakes in the country is 2,854,157, and their total water surface area is 721,644 sq km. Of the total volume of water (27,994 cu km) in lakes, 23,000 cu km or almost 82% is concentrated in Lake Baykal. The volume of water in the three largest lakes of the country (Baykal, Issyk-Kul' and Aral Sea) is 25,750 cu km or 92% of all of the country's lake water. The number of river reservoirs with a total storage of 0.001 cu km or more is 747, and the total volume of water in these reservoirs is 598 cu km. The volume of water in river reservoirs with a normal backwater level is 603 cu km. The total volume of water in all water bodies of the country is 29,101 cu km or almost 7 times the volume of annual runoff into seas, oceans, and enclosed lakes during an average water year (4,384 cu km). Water in rivers is completely renewed 8.7 times a year, i.e., every 42 days. Water in lakes and reservoirs (excluding Lake Baykal and, correspondingly, runoff of the Angara River) is renewed once every 1.3 years. Considering the land area of the Soviet Union (22,272,000 sq km) the total volume of water in water bodies corresponds to a uniform water depth of 1,300 mm, which is 6.6 times the depth of runoff (198 mm) and 2.5 times the depth of atmospheric precipitation (531 mm). (See also W74-09100) (Josefson-USGS)
W74-09111

WATER BALANCE OF WORLD LAKES AND RESERVOIRS (VODNYY BALANS OZER I VODOKHRANILISHCH ZEMNOGO SHARA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
Z. A. Vikulina.
In: Voprosy rezhima i issledovaniya ozer i vodokhranilishch; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 203, p 248-262, Leningrad, 1973. 4 tab, 12 ref.

Descriptors: *Lakes, *Reservoirs, *Water balance, *Hydrologic cycle, Inflow, Precipitation(Atmospheric), Discharge(Water), Runoff, Evaporation, Water level fluctuations, Geographical regions, North America, Europe, Asia, Africa.
Identifiers: *USSR.

Quantitative estimates are made of the volumes of water which contribute to the hydrologic cycle of major and some moderate-size and small lakes and reservoirs in North America, Europe, Asia, and Africa. The volume of water participating in the hydrologic cycle of major lakes in North America is 440 cu km, in Europe--126 cu km, in Asia--172 cu km, and in Africa--153 cu km. The proportion of major incoming components--surface inflow and precipitation--in the water balance of lakes in North America is 55% and 45%, respectively; in Europe--80% and 20%, in Asia--83% and 17%, and in Africa--30% and 70%. The proportion of major outgoing components--runoff and evaporation--in the water balance of lakes in North America is 62% and 38%, respectively, in Europe--86% and 14%, in Asia--39% and 61%, and in Africa--32% and 68%. In areas of intense economic exploitation the total hydrologic cycle increases at the expense of large reservoirs. The volume of water participating in the water balance of Volga River reservoirs is 240 cu km or approximately twice the hydrologic cycle of large lakes of Europe. The results obtained represent the first stage in the study of the hydrologic cycle of lake waters of the world. Additional water-balance studies should include new bodies of water such as large lakes and reservoirs in South America, Australia, and Southeast Asia and should be extended to moderate-size lakes in different climatic zones of the world. (See also W74-09100) (Josefson-USGS)
W74-09112

GREAT LAKES RESEARCH PROJECT FORECASTS DIRECTORY 1973,
National Ocean Survey, Detroit, Mich. Lake Survey Center.
L. X. Barbalas.
Technical Memorandum NOS LSC D 5, April 1973. 280 p.

Descriptors: *Great Lakes, *Research and development, Great Lakes Region, *Limnology, *Meteorology, Research facilities, Sedimentology, Data collections, Environment.
Identifiers: *Directories.

The directory of research in the Great Lakes describes over 270 proposed, continuing, and completed research and development projects, technical reports, theses, and data surveys during 1973. Seven indexes are provided, as follows: (1) Organizational; (2) Geographical; (3) Subject field; (4) Procedures and services; (5) Mode of investigation; (6) Platforms and equipment; and (7) Principal investigators. (Knapp-USGS)
W74-09118

EFFECT OF ENVIRONMENTAL FACTORS ON LAKE ZOOBENTHOS IN THE SOUTHERN PART OF WESTERN SIBERIA (IN RUSSIAN),
Novosibirsk Siberian Research Inst. of the Fish Industry (USSR).
For primary bibliographic entry see Field 5C.
W74-09120

BIOCOENOSES OF THE PALUSTRINE BODIES OF WATER OF THE SOUTHERN PART OF THE LAKE ONEGA-WHITE SEA WATERSHED, (IN RUSSIAN),
For primary bibliographic entry see Field 5C.
W74-09127

FORMATION OF GAS CONDITIONS IN THE VILYUI RESERVOIR, (IN RUSSIAN),
Akademiya Nauk SSSR, Yakutsk. Institut Biologii.
For primary bibliographic entry see Field 5C.
W74-09162

PHYSICAL TRANSPORT OF TRACE METALS IN THE LAKE WASHINGTON WATERSHED,
Washington Univ., Seattle.
For primary bibliographic entry see Field 5B.
W74-09210

ICE THRUST ON SHORES OF NORTH GERMAN LAKES AND ITS EFFECT,
For primary bibliographic entry see Field 2C.
W74-09219

SURVEY OF LAKE FLOODING FROM ERTS-1: LAKE CHAMPLAIN.
Vermont Univ., Burlington. Dept. of Geography.
Available from NTIS, Springfield, Va. 22151 as N73-27247 - Price $3.00 printed copy; $1.45 microfiche. Remote Sensing Laboratory Contract Report, June 1973. 9 p, 6 fig. NASA Contract NAS 5-21753.

Descriptors: *Lakes, *Water level fluctuations, *New York, *Floods, *Remote sensing, Satellites(Artificial), Mapping.
Identifiers: *ERTS, *Lake Champlain(NY).

ERTS-1 imagery showing seasonal lake-level conditions in Lake Champlain can be used to assess shoreline change and flooding extent. MSS bands 6 and 7 provide maximum land-water contrasts and are the most useful for shoreline location. Shoreline changes observed between ERTS coverages of October 10 (low water) and April 7 and 25 (high water) are readily apparent; enlargement of specific scenes by 4X provides data which can be transferred to a map base. The synoptic view provided by ERTS-1 makes it possible to map shoreline positions occurring at a specific lake stage. (Knapp-USGS)
W74-09231

2I. Water In Plants

LABORATORY CULTURE, GROWTH RATE, AND FEEDING BEHAVIOR OF A PLANKTONIC MARINE COPEPOD,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
M. M. Mullin, and E. R. Brooks.
Limnology and Oceanography, Vol 12, p 657-666, 1967. 2 fig, 3 tab, 29 ref.

Descriptors: *Copepods, Ecology, *Animal populations, *Growth rates, Breeding, Marine algae, Saline water, Plankton, Cultures, Diatoms.
Identifiers: *Rhincalamus nasutus, *Artemia salina.

Rhincalanus nasutus was cultured through seven consecutive generations in 19-liter carboys when provided with a mixture of diatoms and Artemia salina nauplii as food. The mean generation length was 8.7 weeks, similar to that of the local field population of this species during some seasons. Fecundity of laboratory-reared animals was lower than that of the field population. Instatnaneous coefficients of individual exponential growth (k in the expression, Wt = Woekt, where W is body weight of organic carbon and t is days) were 0.24 to 0.12/day, depending on the age of the individual. About 10 ug of detrital carbon were produced as exuviae during the growth of an individual. Even young nauplii fed preferentially on large food particles. The suggestion that the copepods' first antennae are used in the feeding process was not supported by an experimental test. R. nasutus nauplii are apparently active enough to avoid being eaten by their parents.
W74-08732

CULTURE STUDIES OF MARINE ALGAE. I. EISENIA ARBOREA,
G. J. Hollenberg.
American Journal of Botany, Vol 26, p 34-41, January 1939.

Descriptors: *Marine algae, *Life cycles, *Cytological studies.
Identifiers: *Eisenia arborea, Gametophyte plants, Laminariales.

A cytological investigation was made of critical stages in the life cycle of Eisenia arborea. The life cycle and the gametophyte plants of Eisenia arborea are essentially like those described for other members of the Laminariales.
W74-08733

THE DEVELOPMENT OF ARTIFICIAL MEDIA FOR MARINE ALGAE,
Haskins Labs., New York; and Marine Biological Station, Millport (Scotland).
L. Provasoli, J. J. A. McLaugillin, and M. R. Droop.
Archiv fur Mikrobiologie, Bd 25, p 392-428, 1957.

Descriptors: *Marine algae, *Cultures, Water chemistry, *Reviews.
Identifiers: The development of culture media for marine algae is traced from the time of Miquel (1890) to the present. The principles involved in designing synthetic media suitable for bacteria-free cultures of a variety of exacting organisms are discussed and an account given of their application in the United States and United Kingdom.
W74-08734

REMATING IN A PLANKTONIC MARINE CALANOID COPEPOD,
Naval Research Lab., Washington, D.C.
D. F. Wilson, and K. K. Parrish.
Marine Biology, Vol 9, p 202-204, 1971.

Descriptors: *Copepods, *Plankton, Cultures, Productivity, *Breeding.
Identifiers: *Acartia tonsa, *Remating.

The knowledge that the initial mating in planktonic copepods may be inadequate to permit realization of a female's total reproductive potential, and that remating can occur, has important implications for both population dynamics and speciation studies. Acartia tonsa Dana females in controlled laboratory experiments were successfully remated after becoming totally infertile following approximately 3 weeks of highly fertile production. Large numbers of viable nauplii resulted from these second matings.
W74-08735

CULTURE OF A PLANKTONIC CALANOID COPEPOD THROUGH MULTIPLE GENERATIONS,
Naval Research Lab., Chesapeake Beach, Md.
E. J. Zillioux, and D. F. Wilson.
Science No. 151 (3713), p 996-998, 1966 (illus).

Descriptors: *Growth rates, *Cultures, *Copepods, Productivity, *Reproduction.
Identifiers: *Acartia tonsa.

Acartia tonsa has been propagated through 12 filial generations during 1 year in small laboratory cultures. The mean generation time was 25 days at 17 degrees C on a slightly suboptimum, mixed algal diet. Body size, reproductive capacity, and generation time were unchanged during the culture period.
W74-08744

REFLECTANCE, TRANSMITTANCE, AND ABSORPTANCE OF LIGHT BY SUBCELLULAR PARTICLES OF SPINACH (SPINACIA OLERACEA L.) LEAVES,
Agricultural Research Service, Weslaco, Tex.
For primary bibliographic entry see Field 3F.
W74-08809

NATIVE INFUSORIA OF THE RIVER SVETUPE IN SUMMERTIME, (IN RUSSIAN),
Akademiya Nauk Latviiskoi SSR, Riga. Inst. of Biology.
R. A. Liepa.
Latv Psr Zinat Akad Vestis. 3, p 27-32, 1973. Illus. (English summary).
Identifiers: Fauna, *Infusoria, *Protozoa, Rivers, Temperature, *USSR(River Svetupe), Seasonal.

In the small river Svetupe (USSR) and in the estuaries of its tributaries (Perlupe, Arupe) the variety of free living protozoa appears to be insignificant. A total of 77 species of Protozoa were found: 56 in Svetupe, 28 in Perlupe and 17 in Arupe. The average number of Protozoa fluctuates from 90-160/sq.m, the maximum number 1020 thousand/sq. m, the minimum number 20 thousand/sq. m. The number of Protozoa depends on the temperature changes: the lowest number was observed in the second part of the month, when rapid lowering of the temperature occurred. The tributaries of the River Svetupe (Perlupe, Arupe), the hydrological structure and fauna of which greatly differ from that of the main stream, do not affect the structure and number of protozoa in the River Svetupe.--Copyright 1973, Biological Abstracts, Inc.
W74-08925

VASCULAR PLANTS OF WASTE STORAGE SITES IN THE 200 AREAS OF THE HANFORD RESERVATION,
Battelle-Pacific Northwest Lab., Richland, Wash.
K. R. Price, and W. H. Rickard.
Available from NTIS, Springfield, Va, as Rept No BNWL-1796; $4.00/copy, $1.45/microfiche. Report No BNWL-1796. December 1973, 7 p.

Descriptors: *Radioactive waste disposal, *Waste storage, *Washington, *Plant populations, *Vascular tissues, Tracheids, Habits, Environment, Aquatic plants, Water pollution, Nuclear powerplants, Speciation, Data collections, Ecosystems.
Identifiers: *Richland(Wash).

A brief account is presented of terrestrial, riparian and semi-aquatic plants known to be associated with radioactive waste storage sites in the 200 Areas of the Hanford Reservation. In most cases the species are characteristic of those which generally inhabit the reservation, but some plants are restricted to specialized habitats provided by particular waste storage sites. It is impractical to list all species growing at each waste storage site because of seasonal variation and changes brought about by environmental management practices. An alphabetical listing has been prepared with an example of where each species is known to occur. This list will be updated as needed and expanded to include other waste storage areas. Plant specimens were collected during spring and fall when flowering material was available. Herbarium mounts were prepared of many specimens and have been retained as part of the Hanford Reservation herbarium collection. Identification to species level was made whenever possible. (Houser-ORNL)
W74-08967

VERTICAL DIFFERENTATION OF TIEN-SHAN TORRENTS, BASED ON THE DISTRIBUTION OF CHARACTERISTICS OF WATER INSECTS, (IN RUSSIAN),
Akademiya Nauk SSR, Leningrad. Zoologicheskii Institut.
K. A. Brodskii, and E. O. Omorov.
Gidrobiol Zh. Vol 9 No 2 p 40-51, 1973. Illus. (English summary).
Identifiers: Ameletus-Alexandrae, Asioreas-Nivia, Asiores-Tianschanica, Asiores-Turkestanica, Blepharocera-Asiatica, *Distribution patterns, Ecological factors, Iron-Montanus, Iron-Rheophilus, Rhithrogena-Tianschanica, Tianschanella-Monstrudsa, *USSR(Tien-Shan), *Aquatic insects.

An ecological-faunistic vertical differentiation of the mountain torrents in Tien-Shan (USSR) is presented. It is based on the occurrence of guide water insects (Ephemeroptera, Trichoptera and Diptera-Blepharoceridae). Two torrents in N and S Tien-Shan were subjected to a detail study; more than 60 were studied in general. The scheme is of rather universal significance and may be successively applied to Karakorum, Hindu-Kush and Himalaya mountain countries. Due to their faunas, the following zones are distinguished within Tien-Shan range: zone of glacier springs, zone of upper, middle and lower flow currents. Comparisons with schemes for Europe and North America show that Tien-Shan differs from them in specific peculiarities, making it possible to distinguish this distinct type of torrent for mountain countries of Asia. The most characteristic water insect guide species are endemics for Tien-Shan, Pamirs and adjoining mountain regions (Iron mountanus, I. rheophilus, Rhithrogena tianschanica, Ameletus alexandrae, Tianschanella monstruosa, Blepharocera asiatica, Asioreas nivia, A. tianschanica, A. turkestanica, etc.).--Copyright 1973, Biological Abstracts, Inc.
W74-09063

EFFECTS OF VARIOUS WATER REGIMES ON STOMATAL AND MESOPHYLL CONDUCTANCES OF BEAN LEAVES,
Akademiya Nauk Estonskoi SSR, Tartu. Institut Fiziki i Astronomii.
For primary bibliographic entry see Field 3F.
W74-09247

2J. Erosion and Sedimentation

LACUSTRINE SALT DEPOSITS UNDER PRESENT-DAY SEDIMENTS OF THE ARAL SEA (SOLYANYYE OZERNYYE OTLOZ-

HENIYA POD SOVREMENNYMI OSADKAMI ARAL'SKOGO MORYA),
Akademiya Nauk Uzekskoi SSR, Tashkent. Institut Geologii i Geofiziki.
For primary bibliographic entry see Field 2H.
W74-08712

LIGHTING UP THE HAZE OF TURBIDITY MEASUREMENT.
For primary bibliographic entry see Field 7B.
W74-08912

TURBIDIMETERS MONITOR DUBAI FLOOD WATER.
For primary bibliographic entry see Field 7B.
W74-08913

DISTRIBUTION OF SELECTED TRACE METALS IN SOUTHERN LAKE MICHIGAN AND LOWER GREEN BAY,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-08934

LABORATORY SIMULATION OF RAINFALL EROSIVITY FOR GULLY FORMATION STUDY,
Kentucky Univ., Lexington. Water Resources Research Inst.
T. Y. Kao.
Available from the National Technical Information Service as PB-232 999; $3.75 in paper copy, $1.45 in microfiche. Research Report No 73, May 1974. 61 p, 23 fig, 4 tab, 21 ref. OWRR A-037-KY(1). 14-31-0001-3517 and 14-31-0001-3817.

Descriptors: *Simulated rainfall, *Gully erosion, *Rainfall simulators, *Soil erosion, Kinetics, Energy, Simulation analysis.
Identifiers: Water drops, Momentum, Erosivity index.

The objective was to develop a rainfall simulator, which imparts to the laboratory rainfall the more important characteristics of natural rainfall such as intensity, drop spectrum, kinetic energy, and momentum at impact, for using in soil erosion research with better results. In developing this simulator the better features of the basic types of earlier simulators, drip and nozzle, have been incorporated into this single design. The simulator developed in this study consists of a number of individual box modules placed in a rectangular pattern to form a single unit. Each module has a grid of capillary holes with cone shaped exits drilled through the bottom plate. The modules were mounted so that their bottom plates form the ceiling of a pressurized room. This provides a hydrostatic pressure differential between the bottom plate and the water surface in each module, such that water will not leak through the holes during the nonoperating state. When pressure pulses are applied to the water surface in each module, water drops are ejected with an initial velocity so that a terminal velocity corresponding to a natural rain drop can be attained without requiring excessive height of fall. The test results indicated that this simulator provides good simulation of the natural rainfall erosivity. (Grieves-Kentucky)
W74-08937

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, TAOS COUNTY,
New Mexico State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-09054

PROTOCOL FOR EVALUATING THE NITROGEN STATUS OF LAKE SEDIMENTS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5C.
W74-09065

A BACTERIAL METHYLMERCURY-MINERALIZING ACTIVITY IN RIVER SEDIMENTS,
Brussels Univ. (Belgium). Laboratorium voor Ekologie en Systematiek.
For primary bibliographic entry see Field 5B.
W74-09092

SEDIMENT DISTRIBUTION AND EVOLUTION OF TIDAL DELTAS ALONG A TIDE-DOMINATED SHORELINE, WACHAPREAGUE, VIRGINIA,
Texas Univ., Austin. Bureau of Economic Geology.
For primary bibliographic entry see Field 2L.
W74-09099

SEDIMENT DISCHARGE IN THE TRINITY RIVER BASIN, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
J. M. Knott.
Water-Resources Investigations 49-73, April 1974. 56 p, 17 fig, 8 tab, 29 ref.

Descriptors: *Sediment discharge, *Sediment transport, *California, Bed load, Suspended load, Sediment yield, Floods, Channel morphology.
Identifiers: *Trinity River basin(Calif).

Long-term total-sediment discharge of the Trinity River, California, and selected tributaries is estimated. Water-discharge data for the period 1912-70 and sediment data collected between 1955 and 1970 were used to evaluate trends and relations between sediment discharge (suspended and bedload) and water discharge. The hydraulic and sediment-transport characteristics of many of the streams in the basin were significantly altered by the December 1964 flood. The depth and velocity of streams changed drastically; for equal magnitudes of streamflow, suspended-sediment discharges after the 1964 flood were several times larger than before the flood. The long-term average annual sediment discharge of the Trinity River near Hoopa is estimated to be 3,120,000 tons. The percentage of clay, silt, and sand or coarser material at this station is estimated to be 20, 32, and 48 percent. Bedload discharge is estimated to be 19 percent of the total-sediment discharge. (Knapp-USGS)
W74-09225

2K. Chemical Processes

CALCIUM-MAGNESIUM-POTASSIUM EQUILIBRIA IN SOME CALIFORNIA SOILS,
California Univ., Davis. Dept. of Pomology.
For primary bibliographic entry see Field 2G.
W74-08814

FURTHER EVIDENCE FOR THE INABILITY OF THE KJELDAHL TOTAL NITROGEN METHOD TO FULLY MEASURE INDIGENOUS FIXED AMMONIUM NITROGEN IN SUBSOILS,
Nebraska Univ., Lincoln. Agricultural Experiment Station.
For primary bibliographic entry see Field 2G.
W74-08819

FLUID SAMPLE ANALYSIS SYSTEM,
Durrum Development Corp., Palo Alto, Calif. (assignee)
For primary bibliographic entry see Field 7B.
W74-08914

INTERACTING DIFFUSE LAYERS IN MIXED MONO-DIVALENT IONIC SYSTEMS,
Volcani Inst. of Agricultural Research, Bet Dagan (Israel).
For primary bibliographic entry see Field 2G.
W74-08920

INVESTIGATION OF THE CHEMICAL IDENTITY OF SOLUBLE ORGANOPHOSPHORUS COMPOUNDS FOUND IN NATURAL WATERS,
Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5A.
W74-08935

CHEMISTRY IN THE EXPLORATION AND EXPLOITATION OF HYDROTHERMAL SYSTEMS,
Department of Scientific and Industrial Research, Wellington (New Zealand). Chemistry Div.
W. A. J. Mahon.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1310-1322, 1973. 3 fig, 2 tab, 17 ref.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Geochemistry, *Water chemistry, Exploration, Heat flow, Thermal water, Mineral water, Boreholes, Thermal springs, Sampling.
Identifiers: *Borehole geochemistry, New Zealand, Geothermal power.

Geochemistry plays an important role in the investigation of hydrothermal systems. Experimental information on the geochemistry of individual elements in high temperature environments, and thermodynamic data for solution equilibria and gas solubilities has enabled detailed interpretations to be made of natural hot water and steam compositions. The lateral extent and chemical uniformity of the deep system can often be judged, and zones of high rock permeability connecting the aquifer at depth to the surface outlined. Minimum estimates of the deep water temperature may be made from the concentration of constituents such as silica, magnesium, and fluoride, and from the ratio of sodium to potassium in the spring waters. The tendency for deposition of minerals, particularly calcite, in the deep aquifer during exploitation, can sometimes be assessed from the carbon dioxide and ion concentrations in the surface flows. Information on rock types in the deep system may be obtained from the surface water chemistry. The chemistry of fluids discharged from drillholes during exploration and production drilling provides information on the temperature of the water supplying the drillholes, the migration of fluids and the distribution of steam and water in the system, changes in temperatures and pressures in the aquifer during exploitation, and the possibility of minerals depositing. Examples are given of interpretations of this type from the New Zealand hydrothermal areas of Wairakei, Broadlands, Waiotapu, Orakeikorako, and Ngawha. (See also W74-08973) (Knapp-USGS)
W74-09013

ORIGIN OF THERMAL WATERS ON THE BASIS OF THEIR RADIOISOTOPIC CONTENT,
Adademiya Nauk SSSR, Moscow. Geologicheskii Institut.
V. V. Cherdyntsev.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1340-1343, 1973. 3 tab, 5 ref.

Descriptors: *Geochemistry, *Radioisotopes, *Geothermal studies, *Hydrothermal studies, Volcanoes, Thermal water, Mineral water, Exploration, Thermal springs.
Identifiers: *USSR, Geothermal power.

The contents of the isotopes of U, Ra, Th, Rn, Ac, and Pb were investigated in waters of active volcanism (Kamchatka, Kuril Islands) and in thermal waters of neovolcanic regions (Caucasus), USSR. The content of radioisotopes in the condensates of the volcanic vapors is very like that of the depth gases. (See also W74-08973) (Knapp-USGS)
W74-09015

THE COLLECTION AND ANALYSIS OF VOLCANIC AND HYDROTHERMAL GASES,
Department of Scienfific and Industrial Research, Taupo (New Zealand). Chemistry Div.
J. B. Finlayson.
In: Proceedings of the United Nations Sumposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1344-1354, 1973. 7 fig, 1 tab, 45 ref.

Descriptors: *Sampling, *Geochemistry, *Water chemistry, *Thermal water, *Hydrothermal studies, Gases, Geothermal studies, Water analysis, Volcanoes, Radioisotopes.
Identifiers: *Hydrothermal gases, New Zealand, Geothermal power.

A knowledge of the composition of the gas phase associated with the various surface emanations of volcanic and geothermal systems forms an essential part of the study of these systems. Gases play a major role in eruptive phenomena, such as lava fountains and volcanic explosions, and may be useful in predicting eruptions. The interpretation of the composition of gases emitted from fumaroles, hot springs and drillholes in a geothermal field gives a better understanding of the underlying hot water aquifer. A survey of the literature since the beginning of this century shows that five basic methods have been employed for taking gas samples: displacement of air from the sample container, displacement of water or mercury, vacuum tubes or flasks, condensation and absorption. Specific examples are given of the application of these methods either singly or incombination. The advantages and disadvantages of these techniques are discussed, particularly with respect to their success in meeting requirements for the collection of a gas sample. Specific examples of methods used for the analysis of gas samples are discussed. The techniques include absorption methods, wet chemical methods both titrimetric and gravimetric, and instrumental methods (spectroscopy, mass spectrometry and gas chromatography). Possible ways to improve collecting techniques are discussed and the possible application of some more recent instrumental methods of analysis are suggested. (See also W74-08973) (Knapp-USGS)
W74-09016

INTERPRETATION OF GAS COMPOSITIONS FROM THE WAIRAKEI FIELD OVER 10 YEARS,
Department of Scientific and Industrial Research, Taupo (New Zealand). Chemistry Div.
R. B. Glover.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1355-1366, 1973. 9 fig, 4 tab, 13 ref.

Descriptors: *Sampling, *Geochemistry, *Water chemistry, *Thermal water, *Hydrothermal studies, Gases, Geothermal studies, Water analysis, Volcanoes, Radioisotopes.
Identifiers: *Hydrothermal gases, *New Zealand, Geothermal power.

From 1959 to 1969 15 systematic surveys of the carbon dioxide and hydrogen sulphide content of the Wairakei geothermal drillhole discharges were made. Gas solubility data were used to calculate theoretical curves relating the percentage steam separation from the original water to the carbon dioxide content, hydrogen sulphide content, and the carbon dioxide/hydrogen sulphide ratio in both the separated steam and the residual water. From a comparison of the actual gas concentrations of drillhole discharges with the theoretical curves, it was possible to deduce the underground separation and mixing processes taking place and to follow changes in downhole pressures and temperatures. Either nonequilibrium gas and steam separation takes place or steam separation occurs in several stages during the movement of the geothermal fluid. Evidence from downhole temperatures measured under nondischarging conditions, the supply water temperatures during discharge calculated from silica concentrations, and enthalpy data suggest that many drillholes are discharging water which has lost steam at some distance from the drillholes. (See also W74-08973) (Knapp-USGS)
W74-09017

HIGH ACTIVITY HYDROTHERMAL ZONES DETECTED BY NA/K, CERRO PRIETO, MEXICO,
Comision Federal de Electricidad, Mexico City. Geothermochemical Research.
S. Mercado.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1367-1376, 1973. 10 fig, 1 tab, 20 ref.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Geochemistry, Water chemistry, Exploration, Heat flow, Thermal water, Mineral water, Boreholes, Thermal springs, Sampling, *Mexico.
Identifiers: *Borehole geochemistry, Geothermal power.

The chemical index or molar ratio Na/K is a good indicator of high hydrothermal activity zones in the Cerro Prieto geothermal field, Mexico. Drillholes with a Na/K ratio of 6 have bottom temperatures of 370 deg C and 70 kg/sq cm of pressure at the wellhead, and drillholes with high Na/K proportion (16) have only 160 deg C at the bottom and 3 kg/sq cm of pressure at the wellhead. The Na/K ratio is indicative of the high steam production zones and helps to determine the underground water distribution and migration with acceptable results. (See also W74-08973) (Knapp-USGS)
W74-09018

CHEMICAL STUDIES IN MEXICAN GEOTHERMAL FIELDS,
Comision Federal de Electricidad, Mexico City Inst. of Investigations of Electrical Industry.
B. R. Molina, and C. J. Banwell.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1377-1391, 1973. 4 fig, 9 tab, 8 ref.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Geochemistry, *Water chemistry, Exploration, Heat flow, Thermal water, Mineral water, Boreholes, Thermal springs, Sampling, *Mexico.
Identifiers: *Borehole Geochemistry, Geothermal power.

Chemical samples have been analyzed from the geothermal fields of Los Humeros, Ixtlan de los Hervores, Los Negritos, Pathe, and Cerro Prieto, all in Mexico. Quantitative analyses for up to 16 principal elements or compounds were made on water samples as well as from selected hot springs, and steam and gas discharges were analyzed for seven gaseous elements and compounds. In Los Humeros, where the manifestations consist only of dry steam vents, water analyses were made on condensate, but in the other areas the analyses were made on samples from hot springs, geysers, and mud pools. In Ixtlan de los Hervores, water samples were also available from two test drillholes. Samples were taken from a large enough number of points to permit isochemical contours of several kinds to be drawn in each area, and the resulting patterns show a striking correlation with certain of the geological and geophysical data. These correlations have been of considerable value for siting prospecting drillholes in the Ixtlan area. A number of the more important chemical relationships were plotted in the conventional type of triangle or other form of diagram and compared with similar data from fields in other parts of the world. (See also W74-08973) (Knapp-USGS)
W74-09019

GEOCHEMISTRY OF THE AHUACHAPAN THERMAL AREA, EL SALVADOR, CENTRAL AMERICA,
Iceland Univ., Reykjavik. Science Inst.
G. E. Sigvaldason, and G. Cuellar.
In: Proceedings of the United Nations Sumposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1392-1399, 1973. 1 fig, 4 tab, 11 ref.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Geochemistry, *Water chemistry, Exploration, Heat flow, Thermal water, Mineral water, Boreholes, Thermal springs, Sampling.
Identifiers: *El Salvador.

Geothermal activity in El Salvador consists of two types of thermal areas: Low temperature areas with hot spring activity, and high temperature areas also displaying fumarolic activity. The high temperature area at Ahuachapan is being studied at present, and deep drilling has started. Two distinct chemical types of thermal water exist in the area: a shallow aquifer with a moderate concentration of dissolved solids (temp. 120-150 deg C) and a deep aquifer with saline water (temp at least 228 deg C). The shallow aquifer probably represents a normal groundwater body which is heated by escaping steam and water from the lower aquifer, and by conduction. Deuterium analyses of both types of thermal water show similar values to those found in cold water springs in the area, indicating common meteoric origin. (See also W74-08973) (Knapp-USGS)
W74-09020

A NOTE ON THE HOT SPRINGS OF ECUADOR,
Proyecto Minero, Quito (Ecuador).
A. De Grys, J. Vera, and P. Goossens.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1400-1404, 1973. 1 fig, 3 tab, 18 ref.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Geochemistry, *Water chemistry, Exploration, Heat flow, Thermal water, Mineral waters, Boreholes, Thermal springs, Sampling.
Identifiers: *Ecuador.

Waters from several Ecuadorian hot springs were analyzed. The springs may be divided into three groups: (a) coastal springs; (b) a northern group of springs which are in the vicinity of volcanoes; and (c) a southern group of springs associated with travertine deposits, situated in an area of Plio-Pleistocene volcanism. The last group has waters with high concentrations of Ca HCO3, Na, and Cl, besides adnormal amounts of Li, As, and B; the SO4 content is low. There may be a relationship between these waters and the numerous epithermal deposits in the area. (See also W74-08973) (Knapp-USGS)
W74-09021

DEUTERIUM AND CHLORIDE IN GEOTHERMAL STUDIES IN ICELAND,
Iceland Univ., Reykjavik. Science Inst.
B. Arnason, and J. Tomasson.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1405-1415, 1973. 6 fig, 6 tab, 12 ref.

Descriptors: *Thermal water, *Hydrothermal studies, *Deuterium, *Chlorides, Groundwater

movement, Hydrogeology, Water chemistry, Tracers.
Identifiers: *Iceland, Geothermal power.

In Iceland, deuterium measurements are useful for distinguishing between different water systems, even in the same geothermal field. One of the areas is fed by at least three hot-water systems of different origin. Two other areas are fed by two hotwater systems each. Deuterium measurements used together with chemical analyses of the water may give valuable information about the chemical composition of the geological formations through which the groundwater flows and about the chemical reactions taking place. In some cases the groundwater, initially meteoric, has passed through chloride-rich formations in the ground whereby it acquires considerable amounts of chloride. In one place the hot-water originates in the ocean. The possibility that the deuterium concentration of the hot-water may change during its passage underground is discussed; on the basis of data available at present it is concluded that such a change does not take place. In one of the areas the hot groundwater contains less deuterium than the lowest yearly average value of precipitation found in Iceland at present. The explanation offered for this is that this water dates from a time when the climate was considerably colder than it is today. (See also W74-08973) (Knapp-USGS)
W74-09022

CHEMICAL PROSPECTING OF STEAM AND HOT WATER IN THE MATSUKAWA GEOTHERMAL AREA,
Japan Metals and Chemicals Co., Ltd., Morioka.
Y. Fujii, and T. Akeno.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1416-1421, 1973. 3 fig, 6 tab.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Geochemistry, *Water chemistry, Exploration, Heat flow, Thermal water, Mineral water, Boreholes, Thermal springs, Sampling.
Identifiers: *Geothermal prospecting, *Japan, Geothermal power.

In the Matsukawa geothermal area, Japan, the first experimental well, AR-1, was drilled in 1960, and the sixth production well, No. 6, was completed January, 1969. The steam of Matsukawa is classified into three types according to the physical characteristics such as the degree of moisture and existence of hot water. Chemically, it is classified in two types according to the composition of the steam. The shallower wells tend to contain more hydrogen sulfide. Drilling a new well did not cause any decrease of the steam amount in former wells. With regard to the discharge of hot water, however, interference was observed between No 1 and No 4 wells, and No 1 and No 5 wells. (See also W74-08973) (Knapp-USGS)
W74-09023

GEOCHEMISTRY OF THE WATERS DISCHARGED FROM DRILLHOLES IN THE OTAKE AND HATCHOBARU AREAS,
Kyushu Univ., Beppu(Japan). Inst. of Balneotherapeutical Research I.
A. Koga.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1422-1425, 1973. 3 tab.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Geochemistry, *Water chemistry, Exploration, Heat flow, Thermal water, Mineral water, Boreholes, Thermal springs, Sampling.
Identifiers: *Geochemical prospecting, *Japan, Geothermal power.

The waters discharged from drillholes at Otake and Hatchobaru geothermal areas in Japan are slightly alkaline and contain sodium and potassium chlorides as major constituents. Otake and Hatchobaru waters may be somewhat diluted with shallow waters rich in sulphate and bicarbonate. The water temperatures calculated were between 195 deg C and 240 deg C at Otake, and 300 deg C at Hatchobaru. In general, the deep waters at Otake and Hatchobaru, especially Hatchobaru water, may be considered typical of geothermal areas in Japan. (See also W74-08973) (Knapp-USGS)
W74-09024

PHYSICO-CHEMICAL SAMPLING OF HIGH TEMPERATURE WELLS IN CONNECTION WITH THEIR ENCRUSTATION BY CALCIUM CARBONATE,
Adademiya Nauk SSSR, Novosibirsk. Institut Neorganicheskoi Khimii.
For primary bibliographic entry see Field 4B.
W74-09036

THERMAL WATERS AS A SOURCE FOR EXTRACTION OF CHEMICALS,
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
A. V. Shcherbakov, and V. I. Dvorov.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1636-1639, 1973. 2 fig, 5 ref.

Descriptors: *Saline waters, *Hydrothermal studies, *Thermal water, Salts, Bromine, Chlorine, Iodine, Potassium, Lithium, Rubidium, Groundwater, Brines, Mineral water.
Identifiers: *USSR.

Thermal waters have become the focus of attention in recent years as a source of mineral reserves and energy, both in the Soviet Union and abroad. Chloride waters, rich in salts of bromine, potassium, lithium, and strontium are formed in halogen formations found throughout the sedimentary sequence. Concentration of bromine, strontium, lithium and rubidium increases with depth of occurrence of thermal waters and rising mineralization, while boron and iodine show a reverse dependence; their concentration goes down with depth and rising mineralization. (See also W74-08973) (Knapp-USGS)
W74-09038

EXPLORATION OF THE REYKIANES THERMAL BRINE AREA,
National Energy Authority, Reykjavik (Iceland).
S. Bjornsson, S. Arnorsson, and J. Tomasson.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1640-1650, 1973. 8 fig, 4 tab, 7 ref.

Descriptors: *Brines, *Water chemistry, *Thermal water, Mineral water, Chlorides, Sodium, Potassium, Calcium, Hydrogeology, Hydrothermal studies.
Identifiers: *Iceland.

The Reykjanes thermal brine area is located in the extreme southwest of Iceland. This area is unique among thermal areas for its fluid composition. In the reservoir where temperatures are between 250 and 290 deg C, the brine has the same salinity as seawater. However, the concentrations of some ions are different and can be explained by relatively simple interaction of seawater with the rock. Due to its temperature and composition, feasibility studies indicate that the brine could be exploited economically for the production of NaCl, KCl, CaCl2, and possibly other components. Aquifers are abundant in the basalt formation. It is therefore recommended that production wells penetrate to depths of about 2,600 m to withdraw brine within this permeable formation so as to ensure highest mass flow and minimize risk of cold seawater intrusion. (See also W74-08973) (Knapp-USGS)
W74-09039

CONTRIBUTION TO THE MINERAL EXTRACTION FROM SUPERSATURATED GEOTHERMAL BRINES, SALTON SEA AREA, CALIFORNIA,
H. H. Werner.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1651-1655, 1973. 2 fig, 4 tab.

Descriptors: *Hydrothermal studies, *Brines, *California, *Water chemistry, Mineral water, Thermal water, Zinc, Lead, Tin, Titanium, Copper, Silver, Gold, Beryllium, Scaling, Thermal power.
Identifiers: *Geothermal power, *Salton Sea(Cal).

Mud volcanoes, pumicite domes, and warm thermal springs are characteristic for the Salton Sea geothermal area in the northern part of the Imperial Valley, California. The recovery of Zn, Pb, Sn, Ti, Cu, Ag, Au and Be could amount to about $264,670 per well per year. In some cases the value of the minerals can supersede the value derived from the sale of the power and will make the complete project viable. (See also W74-08973) (Knapp-USGS)
W74-09040

GEOTHERMAL PRODUCTION OF ELECTRICAL ENERGY AND CERTAIN MINERALS,
Makerere Univ., Kampala (Uganda). Dept. of Physics.
For primary bibliographic entry see Field 2F.
W74-09041

2L. Estuaries

ECOLOGICAL EQUILIBRIUM OF RIVER-ESTUARY-SEA SYSTEMS AND IMPROVEMENT OF THEIR EFFICIENCY FOR THE NATIONAL ECONOMY (O EKOLOGICHESKOM RAVNOVESII SISTEM REKA-LIMAN-MORE I POVYSHENII IKH NARODNOKHOZYAYSTVENNOY EFFEKTIVNOSTI),
Akademiya Nauk URSR, Odessa. Institut Ekonomiki.
M. T. Meleshkin, and M. Sh. Rozengurt.
Vodnyye Resursy, No 4, p 68-82, 1973. 4 fig, 3 tab, 18 ref.

Descriptors: *Balance of nature, *Ecosystems, *Saline water intrusion, *Saline water-freshwater interfaces, *Estuaries, Rivers, Oceans, Lagoons, Fish establishment, Fish populations, Fishkill, Human population, Systems analysis, Maps.
Identifiers: *USSR, *Dniester River, *Dnieper River, *Danube River.

The possibility is examined of applying the systems approach to solution of the problem of transformation of natural conditions of the river-estuary-sea system under influence of human activity. The systems concept of a river-estuary-sea ecosystem can eventually be used to simulate processes occurring at the level of interaction of subsystems and to qualitatively evaluate the structural relations. The effects of man on natural conditions of the ecosystem are investigated, using, as an example, the Dniester River basin and the Dniester estuary. At the present stage of development of productive resources in the Southern Economic Region, the sole sources of water are runoff of the Danube (196 cu km), Dniester (8 cu km), Dnieper (51 cu km), and freshwaters of major open estuaries of the Dniester (volume--0.7 cu km) and

Dnieper (volume--3 cu km). Location of estuaries and estuarine lagoons in the northwestern part of the Black Sea is mapped. (Josefson-USGS)
W74-08708

THE SALINITY TOLERANCE OF SOME ESTUARINE PLANKTONIC COPEPODS,
Hull Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-08738

EXPERIMENTAL STUDY OF EGG-LAYING IN THREE NERITIC COPEPOD SPECIES (CENTROPAGES TYPICUS, ACARTIA CLAUSI, AND TEMORA STYLIFERA).
Centre d 'Oceanographie, Marseille (France). Station Marine d 'Endoume.
R. Gaudy.
Marine Biology, Vol 9, p 65-70, 1971.

Descriptors: *Copepods, Life Cycles, Labortory Animals, Phytoplankton, Algae, *Fertility, Productivity.
Identifiers: *France(Gulf of Marseilles), *Acartia clausi, *Temora stylifera, *Centropages typicus.

Egg-laying of 3 common copepod species from the Gulf of Marseilles (Centropages typicus Kroyer, Acartia clausi Giesbrecht, Temora stylifera Dana) has been studied under various trophic conditions, at different periods of the year. The role of phytoplankton abundance in the induction and importance of egg-laying is indicated. The specific quality of the algal suspension used for feeding affected also fertility. A seasonal variation in the importance of egg-laying is established. Some observations are made on egg deposition and development.
W74-08741

INVESTIGATION OF SURFACE FILMS - CHESAPEAKE BAY ENTRANCE,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 5A.
W74-08831

THE ROLE OF ORGANIC DEBRIS AND ASSOCIATED MICRO-ORGANISMS IN PELAGIC ESTUARINE FOOD CHAINS,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 5C.
W74-08837

SEDIMENTARY FLUORITE IN TAMPA BAY, FLORIDA,
University of South Florida, Tampa, Fla. Dept. of Geology.
For primary bibliographic entry see Field 5A.
W74-08907

RADIOLOGICAL SURVEILLANCE AROUND TURKEY POINT, 1970-1971,
Florida State Div. of Health, Jacksonville. Radiological and Occupational Health Section.
For primary bibliographic entry see Field 5A.
W74-08970

PREOPERATIONAL LEVELS OF ENVIRONMENTAL RADIOACTIVITY IN WATER AND SEDIMENT AROUND TURKEY POINT NUCLEAR POWER PLANTS, CARD SOUNDS, FLORIDA,
Florida Univ., Miami. School of Medicine.
For primary bibliographic entry see Field 5A.
W74-08971

THE DEMOGRAPHIC, POLITICAL, AND ADMINISTRATIVE SETTING,
Florida Univ., Gainesville. Urban Studies Bureau.
For primary bibliographic entry see Field 6B.
W74-09058

HYDROGRAPHY AND BEACH DYNAMICS,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
For primary bibliographic entry see Field 6B.
W74-09059

DEPOSITION OF DDE AND POLYCHLORINATED BIPHENYLS IN DATED SEDIMENTS OF THE SANTA BARBARA BASIN,
California Univ., Bodega Bay. Bodega Marine Lab.
For primary bibliographic entry see Field 5B.
W74-09097

SEDIMENT DISTRIBUTION AND EVOLUTION OF TIDAL DELTAS ALONG A TIDE-DOMINATED SHORELINE, WACHAPREAGUE, VIRGINIA,
Texas Univ., Austin. Bureau of Economic Geology.
R. A. Morton, and A. C. Donaldson.
Sedimentary Geology, Vol 10, No 4, p 285-299, December 1973. 7 fig, 21 ref.

Descriptors: *Sedimentation, *Shores, *Tidal effects, *Littoral drift, Deltas, *Virginia, Beaches, Barrier islands, Geomorphology.
Identifiers: *Wachapreague(Va).

Major inlets in the vicinity of Wachapreague, Virginia have been relatively stable throughout Holocene time; they appear to be located where Pleistocene stream valleys previously existed. Holocene barrier islands apparently developed on drainage divide areas following post-Wisconsin transgression of the sea. The initial phase of tidal delta development was characterized by vertically accreting, fan-shaped, inlet-mouth bars; tidal channels stabilized after bar crests had shoaled sufficiently for marsh to form. With landward progradation across the lagoon, sand-rich deposits graded laterally away from the inlets and vertically into clayey sand and silty clay of the tidal flat bay and marsh environments. Ebb inlet-mouth bars developed asymmetrically southward in response to littoral drift. Flood tidal deltas also built preferentially toward the south as indicated by: (1) sand distribution of the inlet-mouth bar complex; and (2) greater development of marsh south of the inlets. (Knapp-USGS)
W74-09099

STOCHASTIC MODEL OF DYNAMIC EUTROPHIC ESTUARY,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
For primary bibliographic entry see Field 5B.
W74-09114

PROPOSED JETTY-HEAD REPAIR SECTIONS, HUMBOLDT BAY, CALIFORNIA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8A.
W74-09117

BENTHOS IN ARAKUM BODIES OF WATER, (IN RUSSIAN),
Kaspiiskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Makhachkala (USSR).
For primary bibliographic entry see Field 5C.
W74-09142

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

SOME ASPECTS OF THE PROBLEM OF ARTIFICIAL DESALINATION OF NATURAL WATERS OF HIGH DISSOLVED-SALTS CONTENT (NEKOTORYYE ASPEKTY PROBLEMY ISKUSSTVENNOGO OPRESNENIYA PRIRODNYKH VOD POVYSHENNOY MINERALIZATSII),
Akademiya Nauk SSSR, Moscow. Institut Vodykh Problem.
M. V. Sanin, and M. R. Nikitin.
Vodnyye Resursy, No 4, p 14-36, 1973. 5 fig, 8 tab, 61 ref.

Descriptors: *Desalination, *Desalination processes, *Desalination plants, *Groundwater, *Saline water, Brackish water, Sea water, Brines, Freshwater, Distillation, Ion exchange, Membrane processes, Electrodialysis, Reverse osmosis, Crystallization, Freezing, United States, Australia, Costs, Maps.
Identifiers: *USSR, *Mineralization.

Desalination is discussed in connection with the use of highly mineralized groundwater for water supply. Estimates are made of groundwater resources for the United States, Australia, and the Soviet Union. Desalination methods most adaptable for processing groundwater are described, and data are given on Soviet and foreign desalting plants in operation and on their basic economic indices. Maps show distribution of saline groundwater in the United States, of groundwater of varying salinity on the Australian continent, and of brackish and saline groundwater in the USSR. (Josefson-USGS)
W74-08711

DEVELOPMENT OF A HIGH PRODUCT WATER RECOVERY SYSTEM FOR THE TREATMENT OF ACID MINE DRAINAGE BY REVERSE OSMOSIS,
Envirex, Inc., Milwaukee, Wis. Environmental Sciences Div.
For primary bibliographic entry see Field 5D.
W74-08841

SEAWATER DESALINATION WITH PBI HOLLOW FIBER REVERSE OSMOSIS MEMBRANES,
Celanese Research Co., Summit, N.J.
H. J. Davis, J. S. Soehngen, and F. S. Model.
Available from the National Technical Information Service as PB-230 693/AS, $6.25 in paper copy, $1.45 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-937, March 1974. 58 p, 18 fig, 17 tab, 5 ref. OSW Contract 14-30-3199.

Descriptors: *Desalination, *Membranes, *Reverse osmosis, Permeability, Salt rejection, *Annealing, Pretreatment, Chlorination, Sea water.
Identifiers: *Hollow fibers(PBI), Fiber spinning, In-line annealing.

Laboratory evaluations have shown that the reverse osmosis properties of PBI hollow fiber membranes are adequate for a single-pass desalination of seawater at an operating pressure of 1,000 psi. Against 3.5% (35,000 ppm) sodium chloride feed at 75F, product water with 250 to 350 ppm sodium chloride was obtained in long-term testing; similarly, against 3.6% (36,000 ppm) sea salt solution, product water with 250-350 ppm total dissolved solids was obtained -- well within limits commonly accepted for potable water. In field evaluation tests against chlorinated sea water at 1,000 psi and at about 55F, total dissolved solids

concentrations as low as 108 to 174 ppm were reported. High rejection values 98.8% to 99.4% were obtained and continued at these high levels over the long-term test periods. Product water flux ranged from 0.6 to 1.1 gfd in laboratory long-term testing at 75F and from 0.2 to 0.5 gfd in the field evaluation tests at 55F. (OSW)
W74-08842

APPLICATION OF EXTERNALLY WOUND TUBULAR MEMBRANE SYSTEMS FOR SEA WATER DESALINATION,
Universal Water Corp., San Diego, Calif.
Serop Manjikian.
Available from the National Technical Information Service as PB-229 730/AS, $7.75 in paper copy, $1.45 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-929, March 1974. 86 p, 28 fig, 9 tab. OSW Contract 14-30-3107.

Descriptors: *Desalination, Sea water, *Reverse osmosis, *Membrane processes, Pilot plants, Corrosion, Membranes.
Identifiers: Cellulose acetate membranes, Diacetate-triacetate membranes, Helical elements, Nylon-dacron backing materials.

The primary objective was the modification and adaptation of the externally wound tubular membrane element unit for use in high pressure sea water desalination. Various prototype modules were constructed and tested. Modular components, subassemblies and various materials of construction were evaluated in prototype modules with respect to their mechanical properties, corrosion resistance, and reliability when operated with sea water. The results indicated that the fabrication of cellulosic membrane systems for sea water is technologically and economically practical when the desired goal is 1000 ppm total dissolved solids or less and when operated at 1000 psi at a 20% recovery. With the determination of helical systems sea water operating parameters and the optimization of the externally wound tubular membrane element unit for high pressure applications, a bench scale pilot unit was designed and built for long term evaluation using sea water. (OSW)
W74-08843

FRAME FOR A SEMI-PERMEABLE MEMBRANE ASSEMBLY,
Rhone-Poulene S.A., Paris (France). (Assignee)
For primary bibliographic entry see Field 8C.
W74-08898

PRODUCTION OF FRESH WATER FROM THE ENDOGENOUS STEAM OF CERRO PRIETO GEOTHERMAL FIELD,
Comision Federal de Electricidad, Mexico City.
M. F. De Anda, S. C. Reyes, and M. E. Tolivia.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1632-1635, 1973. 2 fig, 4 tab, 2 ref.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Mexico, *Water supply, Water treatment, Saline waters, Potable water, *Pilot plants.
Identifiers: Geothermal power.

At the Cerro Prieto geothermal field, a pilot plant is used for production of freshwater using the endogenous steam. The cost of freshwater obtained is 1.39 Mexican pesos per cu/m. The cost of freshwater obtained competes with the cost of drinking bottled water, which in Mexicali City is between 1.50 to 2.00 Mexican pesos for a 20 liter flask. (See also W74-08973) (Knapp-USGS)
W74-09037

APPLICATION OF REVERSE OSMOSIS TECHNOLOGY TO HAWAIIAN LOW QUALITY WATERS,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5D.
W74-09052

DESALTING THE SEAS: A STEP TOWARD WORLD PEACE,
R. Schuessler.
Oceans, Vol 4, No 5, p 64-69, September-October 1971. 4 photo.

Descriptors: *Adoption of practices, *Desalination plants, Distillation, Membrane processes, Water yield, Desalination wastes, Fertilizers, Nuclear energy, Cost analysis.

Like outer space in the 1960's, the oceans can now be regarded as the greatest challenge to man's pioneering spirit and engineering skill, and the 1970's could become the decade of the deep, the age of desalting plants. While steps have been taken toward that goal, much more must be done in both building plants and developing cheaper methods of desalting water if the needs of modern society are to be met. Studies show that 41% of water systems deliver water of poor quality. Costs are relatively high at present but certain technology will lower them, and then as a diplomatic means of communication, the U.S. could help the entire world solve their water crisis, preventing droughts and famines. For all the progress today, desalination experts have but scratched the surface in how best to desalt the seas. The two best methods used today are distillation and the membrane method. Some of the collateral aspects of desalination include production of fertilizer, helping to prevent environmental pollution and waste water management. The most promising new method is one that involves the use of nuclear energy in a dual-purpose plant which would power steam turbines to generate electricity and utilize the exhaust steam to evaporate and condense seawater. (Sutton-Florida)
W74-09167

PUBLIC RESPONSE TO DESALTED SEA WATER,
California Univ., Berkeley. School of Public Health.
For primary bibliographic entry see Field 6D.
W74-09171

MULTI-STAGE FLASH DISTILLATION PLANT,
Industrial Science and Technology Agency, Tokyo (Japan). (Assignee)
K. Sato, K. Kamiyama, and K. Tahara.
U. S. Patent No 3,801,471, 3 p, 4 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 921, No 1, p 297, April 2, 1974.

Descriptors: *Patents, *Desalination, *Distillation, *Flash distillation, *Evaporators, *Water treatment, *Potable water, Sea Water.

A multi-stage flash evaporator is capable of producing fresh water in high yield by approximating the adiabatic evaporation process to the state of theoretical rate production. The apparatus comprises in combination, a series of flash evaporator stages connected in horizontal series and each partitioned by a plate. A baffle plate is disposed from an upper surface of each stage and defines an auxiliary flash chamber with a plate along one side of the stage and defines a flash chamber with a plate along the opposite side of the stage. The flash chamber has a demister, a condenser and a product tray disposed at the top. The demister is placed between the baffle plate and the plate at the opposite side of the stage and below the condenser and product tray. A seawater flow path connecting each adjacent pair of flash chambers is provided near its open end on the low-pressure side. (Sinha-OEIS)
W74-09174

PROCESS AND APPARATUS FOR SOLAR DISTILLATION UTILIZING CELLULAR CERAMIC NODULES TO IMPROVE THE EVAPORATION RATE,
Pittsburgh Corning Corp., Pa. (Assignee)
N. T. Castellucci, and N. C. Krouskop.
U. S. Patent No 3,801,474, 6 p, 2 fig, 3 tab, 17 ref; Official Gazette of the United States Patent Office, Vol 921, No 1, p 298, April 2, 1974.

Descriptors: *Patents, *Solar distillation, *Evaporation, *Condensation, *Desalination, *Water quality, Sea water, Potable water, Distillation, Saline water.

A process is described for recovering fresh water from brine or salt water by solar distillation. A quantity of substantially spherical cellular ceramic nodules having an outer textured surface is positioned on the upper surface of a body of sea water within a container. The nodules float on the upper surface of the salt water in a partially submerged condition with the upper exposed surfaces of the nodules above the surface of the water. The upper surfaces of the nodules are wetted by the water and a relatively thin film is formed thereon. The film on the upper surface of the nodules is subjected to elevated temperatures by solar radiation and the water in the thin film evaporates and is continually replaced as a thin film from the body of water. The water vapor condenses on a covering surface over the container and is suitably collected. (Sinha-OEIS)
W74-09179

OBTAINING INCREASED HEAD IN WATER SYSTEMS,
G. D. James.
U.S. Patent No. 3,795,587, 3 p, 4 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 920, No 1, p 160, March 5, 1974.

Descriptors: *Patents, *Water vapor, *Desalination, *Condensation, *Water supply, Water treatment.
Identifiers: *Power generation, Water head.

The method for gaining head in a water supply system in which water vapor is generated includes introducing the water vapor into a vertically extended zone and contacting the vapor with relatively cool water droplets moving through the zone condensing the vapor on the droplets, deflecting the droplets repeatedly upward in the zone and collecting the droplets with the condensate upon deflection to the top of the zone. The method further contemplates generating water vapor for introduction into the zone by subjecting relatively warm water to a reduced pressure. The water is introduced into the lower portion of the zone and is dispersed as droplets upward through the zone. Deflection of the droplets in an upward direction may be accomplished by sweeping the zone repeatedly with angularly disposed surfaces adapted to provide upward deflection of impacting droplets. The deflected droplet may be further deflected upward by impacting on a second superjacent surface. The deflection while always upward may have more or less of a horizontal component which is desirably varied from surface to surface impact. (Sinha-OEIS)
W74-09187

3B. Water Yield Improvement

AGRICULTURAL DEMAND FOR WATER IN THE PECOS RIVER BASIN: AN ADDENDUM,
New Mexico Univ., Albuquerque. Dept. of Economics.
For primary bibliographic entry see Field 3F.
W74-08756

WEATHER MODIFICATION.
For primary bibliographic entry see Field 6E.
W74-09133

DESALTING THE SEAS: A STEP TOWARD WORLD PEACE,
For primary bibliographic entry see Field 3A.
W74-09167

AUTHORITY TO LEASE SEA BOTTOM.
For primary bibliographic entry see Field 6E.
W74-09168

PRECIPITATION AUGMENTATION--PROBLEMS AND PROGRESS,
Texas Tech Univ., Lubbock. Dept. of Geosciences.
D. R. Haragan.
Water Resources Bulletin, Vol 10, No 3, p 547-554, June 1974, 10 ref.

Descriptors: *Weather modification, *Artificial precipitation, Cloud seeding, Reviews, Social aspects, Legal aspects, Water management(Applied).

Weather modification and precipitation management are reviewed. Coordination of efforts and intensification of both laboratory and field research could lead to major advances. Scientific efforts should be coordinated with a program designed to inform and educate the public on the role and potential of artificial precipitation augmentation. In addition, careful consideration must be given to social and legal issues. Environmental impact, land use, economic potential and damage liability are all factors of importance in any comprehensive analysis. Rational solutions to questions in each of these areas are dependent upon the establishment of a sound scientific basis for operational weather modification, which should be the first priority. (Knapp-USGS)
W74-09198

A CLIMATOLOGY OF CUMULUS SEEDING POTENTIAL FOR THE WESTERN UNITED STATES,
Navy Weather Research Facility, Norfolk, Va.
P. R. Lowe, D. C. Schertz, and D. A. Matthews.
Available from NTIS, Springfield, Va. 22151 as AD-769 543 - Price $6.50 printed copy; $1.45 microfiche. Technical Paper No 4-71, February 1971. 78 p, 32 fig, 5 tab, 8 ref. USBR Contract 14-06-D-6989.

Descriptors: *Cloud seeding, *Weather modification, *Simulation analysis, Mathematical models, Probability, Climatology, Synoptic analysis, *Southwest U.S.

For rainfall enhancement through the seeding of cumulus clouds, no large body of information relative to the probable outcome of cloud modification exists. Lacking these data, recourse to mathematical simulation of cloud modification is the only means of estimating the likelihood of outcomes of such activity. The WEARSCHFAC-Penn State, one-dimensional, steady state, cumulus model, needs only a small amount of computer memory, and only very little time for processing atmospheric soundings in numbers sufficient to generate a climatology. The seeding procedure represented by the simulation case wherein all liquid water is converted to ice at -15 deg C shows considerably less potential for rainfall enhancement than the procedure represented by the simulation case for conversion at -8 deg C. In terms of increased absolute volumes of water delivered into watershed areas, larger clouds definitely show significantly more potential than smaller ones. There is no significant trend in the amounts of rainfall inhibition with respect to geography. (Knapp-USGS)
W74-09222

IMPROVEMENT OF TROUT STREAMS IN WISCONSIN BY AUGMENTING LOW FLOWS WITH GROUND WATER,
Geological Survey, Washington, D.C.
R. P. Novitzki.
Available from Sup Doc, GPO, Washington, D C 20402 - Price $0.55. Water-Supply Paper 2017, 1973. 52 p, 26 fig, 3 tab, 45 ref, append.

Descriptors: *Low-flow augmentation, *Water temperature, *Wisconsin, Conjunctive use, Groundwater, Streamflow, Fishing, Trout.
Identifiers: Little Plover River(Wisc), Black Earth Creek(Wisc).

Approximately 2 cubic feet per second of groundwater were introduced to augment low flow in the Little Plover River, Wisconsin in 1968 when natural streamflow ranged from 3 to 4 cubic feet per second. These augmentation flows were retained undiminished through the 2-mile reach of stream monitored. Maximum stream temperatures were reduced as much as 5 deg F at the augmentation site during the test period, although changes became insignificant more than 1 mile downstream. Maximum temperatures might be reduced as much as 10 deg F during critical periods, based on estimates using a stream-temperature model developed as part of the study. Augmentation flows of nearly 2.5 cubic feet per second of groundwater were introduced into the headwater reach of Black Earth Creek from the end of June through mid-October 1969. Augmentation flows were retained through the 8-mile reach of stream. Temperature of the augmentation flow as it entered the stream ranged from 60 deg to 70 deg F during the test period, and minimum stream temperatures were raised 5 deg F or more at the augmentation site, with changes extending from 2 to 3 miles downstream. Augmentation during critical periods could maintain stream temperatures between 40 deg and 70 deg F through most of the study reach. Dissolved oxygen levels were increased by as much as 2 milligrams per liter or more below the augmentation site. During critical periods DO improvement in the problem reach would be somewhat greater. (Knapp-USGS)
W74-09224

3C. Use Of Water Of Impaired Quality

SEWAGE WATER IRRIGATION EFFECT ON COTTON GROWTH AND DEVELOPMENT, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
For primary bibliographic entry see Field 5D.
W74-08729

THE IMPROVEMENT OF POOR STRUCTURED BASIN DEPRESSION SOILS AT FUDHALIYA EXPERIMENTAL FIELD,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
J. Dougrameji, B. A. TaKessian, and R. Van Art.
Institute for Applied Research on Natural Resources, Baghdad, Iraq. Technical Bulletin 48, September 1973. 15 p, 4 fig, 6 tab, 4 ref.

Descriptors: *Soil amendments, *Soil texture, *Gypsum, *Planting management, Soil profiles, Organic matter, Alfalfa, Saturation, Lime, Salts, Soil chemistry, Irrigation, Groundwater, Soil water movement, Soil physical properties, Farm wastes.
Identifiers: *Iraq.

A reconnaissance survey in Central Iraq showed that 20 percent of the region is composed of irrigation depression soils with poor structure. The soils exhibit low permeability with puddles and compaction occurring following irrigation. Experiments were conducted using gypsum and farm manure as soil amendments, and a combination of farm manure and deep plowing was also tried. Wheat and alfalfa were cultivated on these sites. No perceptible change occurred from the gypsum application as a result of a restricted plow depth and consequently restricted rooting depth. Application of farm manure resulted in increases of 11-13 percent in alfalfa yields and 25-31 percent for wheat plots. More drastic increases were believed to be hampered due to restricted plow and rooting depths. On plots that were deep plowed significant increases in yields from both crops were evident. The highest yields resulted from combinations of farm manure and deep plowing. (Mastic-Arizona)
W74-08763

PENETRABILITY AND HYDRAULIC CONDUCTIVITY OF DILUTE SULFURIC ACID SOLUTIONS IN SELECTED ARIZONA SOILS,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
For primary bibliographic entry see Field 2G.
W74-08765

SALINITY PROBLEMS OF THE SAFFORD VALLEY: AN INTERDISCIPLINARY ANALYSIS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 5B.
W74-08769

NITROGEN METABOLISM OF STARGRASS AS AFFECTED BY NITROGEN AND SOIL SALINITY,
Department of Agriculture, Watkinsville, Ga.
G. W. Langdale, J. R. Thomas, and T. G. Littleton.
Agronomy Journal, Vol 65, No 3, p 468-470, May-June, 1973. 3 fig, 2 tab, 19 ref.

Descriptors: *Fertility, *Nitrogen, Fertilizers, *Salinity, Nutrient removal, Leaching, Crop response, Saline soils, *Metabolism.

Interactive effects of soil salinity and N fertilizer on stargrass growth and N metabolism were investigated. Nitrogen contents were partitioned to study the effects of substrate salinities on hydrolysis of protein-N and the accumulation nonprotein-N assimilates. Mixed chloride-sulfate solutions of the same ionic ratios and electrical conductivities (EC) of 4.8, 9.6, and 14.4 mmhos/cm were equilibrated with Brennan fine sandy loam soil, after which N was applied in a factorial arrangement at rates of 0, 67, 133, and 200 mg/kg of soil. Nitrogen fertilizer interacted significantly with soil salinity to stimulate dry matter and protein-N yields at the 4.8-mmhos/cm level. No evidence of a toxic nonprotein-N accumulation in plant tissue was observed even with high N fertilization at this salinity level. The 9.6-mmhos/cm salinity treatment was considerably more deleterious to dry matter than to protein-N production processes. (Skogerboe-Colorado State)
W74-08806

CELL WALL PROPERTIES OF COTTON ROOTS AS INFLUENCED BY CALCIUM AND SALINITY,
Texas A and M Univ. Weslaco Agricultural Research and Extension Center.
C. J. Gerard, and E. Hinojosa
Agronomy Journal, Vol 65, No 4, p 556-560, July-August, 1973. 11 fig, 1 tab, 15 ref.

Descriptors: *Salinity, *Crop response, Calcium, Root development, *Cotton(Field), *Root system, Root zone.

Research was conducted to determine the influences of salinity and Ca uptake on cell wall properties of cotton roots. It was postulated that examination of cell wall properties might give insight on the role of Ca in moderating the influences of salinity and toxic ions on cellular stability and plant growth. Age and Ca are essential to th

development of thick cell walls in the stele. Thick cell walls exhibit high birefringence under polarized light. Salinity reduced Ca uptake and concentration of cotton roots. Xylem and phloem cell walls of cotton roots grown in solutions with sufficient Ca and low salinity thickened and in about 70 hours, exhibited high birefringence. Young cell walls in the pericycle or laterals did not exhibit birefringence. Even at adequate level of Ca, salinity retarded the development of thick cell walls and high birefringence in the stele to about 140 hours. (Skogerboe-Colorado State)
W74-08808

LEACHING REQUIREMENT STUDIES: SENSITIVITY OF ALFALFA TO SALINITY OF IRRIGATION AND DRAINAGE WATERS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
L. Bernstein, and L. E. Francois.
Soil Science of America Proceedings, Vol 37, No 6, p 931-943, November-December, 1973. 4 fig, 10 tab, 17 ref.

Descriptors: *Salinity, *Salt balance, *Crop response, *Leaching, *Alfalfa, Lysimeters, Irrigation practices, Sodium, *Drainage engineering.

Alfalfa was grown in 0.6 by 1.5 m greenhouse lysimeters and irrigated with two waters of EC 1 and 2 mmho/cm prepared by adding equivalent amounts of NaCl and CaC12 to a 0.4 mmho/cm tap water. Yields showed relatively little effect of leaching fraction (LF) within the limits consistent with steady-state salt balance for suction-drained lysimeters but decreased 26% at the lowest LF for gravity-drained lysimeters. Yields with the 2 mmho/cm irrigation water treatments were consistently about 10% less than those with the 1 mmho/cm water. Cessation of leaching or reduction of LF to levels requiring drainage water salinities for salt balance at steady state to exceed 35 mmho/cm, the maximum salinity achievable by alfalfa roots, eventually reduced yields. Yields were significantly higher when leaching was done every third or sixth irrigation than in every irrigation while maintaining the same average LF of 1/32 and 1/16 for the 1 and 2 mmho/cm irrigation waters, respectively. (Skogerboe-Colorado State)
W74-08815

GROWTH, MINERAL COMPOSITION, AND SEED OIL OF SESAME (SESAMUM INDICUM L.) AS AFFECTED BY NACL,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
A. H. Yousif, F. T. Bingham, and D. M. Yermanos.
Soil Science Society of America Proceedings, Vol 36, No 3, p 450-453, May-June, 1972. 2 fig, 4 tab, 10 ref.

Descriptors: *Salinity, *Crop response, Sodium, Chlorides, Seeds, *Sodium chloride, *Oilseed crops, *Growth, *Mineralogy.
Identifiers: *Sesame.

The tolerance of sesame to NaCl salinity was studied first during germination, and later during plant growth up to maturity. Germination was conducted in the laboratory at 25C. Sesame plants were tested for response to salinity using nutrient solution cultures with sodium chloride added when test plants were approximately 10 cm tall. Experiments were continued until mature seed pod formation. The data showed a high tolerance during germination but sensitivity at later growth stages. (Skogerboe-Colorado State)
W74-08816

SALINITY-OZONE INTERACTIVE EFFECTS ON YIELD AND WATER RELATIONS OF MUNG BEAN,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 5C.
W74-08922

INVENTORY OF WASTE WATER PRODUCTION AND WASTE WATER RECLAMATION PRACTICES IN CALIFORNIA, 1970-1971,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 5D.
W74-09078

3D. Conservation In Domestic and Municipal Use

DIRECT FILTRATION: AN ECONOMIC ANSWER TO A CITY'S WATER NEEDS,
Springfield Municipal Water Works, Mass. Water Dept.
For primary bibliographic entry see Field 5D.
W74-08788

TALE OF TWIN CITIES, CUTTING THE HIGH COSTS OF POLLUTION CONTROL.
For primary bibliographic entry see Field 5D.
W74-08796

EVALUATING WATER REUSE ALTERNATIVES IN WATER RESOURCES PLANNING,
Utah State Univ., Logan. Center for Water Resources Research.
For primary bibliographic entry see Field 5D.
W74-08940

PRODUCTION OF FRESH WATER FROM THE ENDOGENOUS STEAM OF CERRO PRIETO GEOTHERMAL FIELD,
Comision Federal de Electricidad, Mexico City.
For primary bibliographic entry see Field 3A.
W74-09037

WATER CONSERVATION.
For primary bibliographic entry see Field 6E.
W74-09159

3E. Conservation In Industry

PROCEDURAL PROBLEMS IN PROJECTED PLANNING OF WATER CONSUMPTION AND DIVERSION BY INDUSTRY IN THE USSR (METODICHESKIYE VOPROSY RASCHETA VODOPOTREBLENIYA I VODOOTVEDENIYA V PROMYSHLENNOSTI SSSR NA PERSPEKTIVU),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
B. G. Blagoverov.
Vodnyye Resursy, No 4, p 37-42, 1973.

Descriptors: *Water utilization, *Diversion, *Water requirements, *Industrial production, *Future planning(Projected), Human population, Urbanization.
Identifiers: *USSR.

Major water users in the Soviet national economy are agriculture (irrigation) and industry (including thermal powerplants). In 1970 the discharge of freshwater in all branches of Soviet industry was about 90 cu km or about 40% of total water intake from sources. Approximately 10% of water presently used by industry cannot be recovered. Diversion of flow reaches more than 80 cu km a year. Almost 90% of the water returned by industrial enterprises and thermal powerplants is diverted in either a partially treated or totally untreated form. Techniques are presented for calculating industrial water requirements for the USSR. For projected planning, data are needed on volume of production by types of industry within economic regions and on projected water consumption rates. Water consumption and diversion data obtained from economic regions should be examined in relation to river basins. In the absence of sufficient data, water distribution should be based on projections of urban population. As much as 90%-95% of water consumed and diverted in the Volga Economic Region should be transferred to the Volga River, 4%-8% to the Don River (part of the Penza, Saratov, and Volgograd Oblasts) and 1%-2% to the Ural River (part of the Bashkir ASSR). (Josefson-USGS)
W74-08710

UTILIZATION OF THERMAL WATERS FROM OIL DEPOSITS OF THE CAUCASUS,
Groznenskii Neftyanoi Institut (USSR).
For primary bibliographic entry see Field 4B.
W74-08988

GEOTHERMAL FIELDS IN JAPAN CONSIDERED FROM THE GEOLOGICAL AND PETROLOGICAL VIEW POINT,
Hokkaido Univ., Sapporo (Japan). Dept. of Geology and Mineralogy.
For primary bibliographic entry see Field 2F.
W74-08997

CURRENT STATUS OF GEOTHERMAL POWER PLANTS AT THE GEYSERS, SONOMA COUNTY, CALIFORNIA,
Pacific Gas and Electric Co., San Francisco, Calif. Dept. of Engineering.
For primary bibliographic entry see Field 4B.
W74-09035

TRACE METALS IN EFFLUENTS FROM METALLURGICAL OPERATIONS,
Battelle Columbus Lab., Ohio.
For primary bibliographic entry see Field 5D.
W74-09212

POLLUTION ABATEMENT IN THE METAL FINISHING INDUSTRY,
Environmental Protection Agency, Edison, N.J.
For primary bibliographic entry see Field 5D.
W74-09213

CONTROL AND PREVENTION OF MINE DRAINAGE,
Environmental Protection Agency, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W74-09214

POLLUTION ABATEMENT IN A COPPER WIRE MILL.
Environmental Protection Agency, Washington, D.C. Div. of Technology Transfer.
For primary bibliographic entry see Field 5G.
W74-09244

3F. Conservation In Agriculture

PROCEDURAL PROBLEMS IN PROJECTED PLANNING OF WATER CONSUMPTION AND DIVERSION BY INDUSTRY IN THE USSR (METODICHESKIYE VOPROSY RASCHETA VODOPOTREBLENIYA I VODOOTVEDENIYA V PROMYSHLENNOSTI SSSR NA PERSPEKTIVU),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 3E.
W74-08710

CONTROLLED ENVIRONMENT STUDIES OF THE EFFECTS OF VARIABLE ATMOSPHERIC

WATER STRESS ON PHOTOSYNTHESIS, TRANSPIRATION, AND WATER STATUS OF ZEA MAYS L. AND OTHER SPECIES,
Commonwealth Scientific and Industrial Research Organization, Griffith (Australia). Div. of Irrigation Research.
For primary bibliographic entry see Field 2D.
W74-08754

COTTON LEAF TEMPERATURES AS RELATED TO SOIL WATER DEPLETION AND METEOROLOGICAL FACTORS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
W. L. Ehrler.
Agronomy Journal, Vol 65, p 404-409, May-June 1973. 4 fig, 3 tab, 9 ref.

Descriptors: *Cotton, *Air temperature, *Rates of application, *Moisture deficit, *Soil-water-plant relationships, Leaves, Irrigation practices, Saturation, gravimetric analysis, potentiometers, stomata, Vapor pressure, Evaporation, Regression analysis.

The feasibility of using air temperature difference and moderate soil water depletion relationships as a possible guide for irrigation scheduling of cotton was investigated. Data were gathered during six irrigation cycles during two summers. The experimental plots were irrigated on a schedule to obtain a high lint yield. Results showed it was possible to measure a rise in air temperature difference accompanying a moderate soil water depletion, but the saturation deficit of the air must also be known. Precautions must be taken to make accurate measurements of leaf temperature, air temperature, and vapor pressure through the irrigation cycle. Attention must be paid to species involved. Use of this method is restricted to predominantly sunny regions, but further development is necessary to obtain values predicting maximum yields. (Mastic-Arizona)
W74-08755

AGRICULTURAL DEMAND FOR WATER IN THE PECOS RIVER BASIN: AN ADDENDUM,
New Mexico Univ., Albuquerque. Dept. of Economics.
M. Gisser.
Water Resources Research, Vol 9, No 5, p 1429-1432, October 1973. 4 tab, 2 ref.

Descriptors: *Water demand, Imported water, *Groundwater recharge, *Phreatophytes, Aquifers, Salinity, Evaporation, Pumping, Irrigation, New Mexico, Texas.
Identifiers: *Pecos River(N.Mex.-Tex).

This addendum explores some questions proposed in two earlier studies on importing water to meet agricultural demand in the Pecos River Basin. The first assumed that the water would be stored on the ground if not immediately used. In the second the assumption was that the imported water would be recharged artifically to the aquifer for storage and to reduce high evaporation rates. Some problems posed by earlier studies are defined in this report, particularly salinity constraints and the possibility of reducing natural discharge of water by lowering the evaporation rate of salt cedars and other solutions such as irrigation systems. However, alternative technologies are not sufficiently developed to allow complete evaluation. (See also W70-10055, and W73-04277) (Mastic-Arizona)
W74-08756

AIR TEMPERATURE AND VAPOR PRESSURE CHANGES CAUSED BY SPINKLER IRRIGATION,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
R. A. Kohl, and J. L. Wright.
Agronomy Journal, Vol 66, p 85-88, January-February 1974. 2 fig, 2 tab, 14 ref.

Descriptors: *Evaporation, *Air temperature, *Humidity, *Vapor pressure, *Sprinkler irrigation, Evaportranspiration, Solar radiation, Wind velocity.

Evaporation from a sprinkler irrigation system was investigated to determine whether air temperature and vapor and vapor pressure downwind were changed enough to offset plant growth and water use. Wet-bulb and dry-bulb temperatures were measured along with wind speed and direction. As a result of spray evaporation, air temperature was reduced less than 1 degree C and vapor pressure in the air was increased less than 0.8 mb. The effects are considered insignificant when compared to the influence of an actively transpiring crop; and compared with diurnal and cyclonic temperature changes, the sprinkler effects are very small. The amount of change in air temperature and humidity is not likely to produce any significant change in plant growth or evaporation losses of water. (Mastic-Arizona)
W74-08757

THE IMPROVEMENT OF POOR STRUCTURED BASIN DEPRESSION SOILS AT FUDHALIYA EXPERIMENTAL FIELD,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
For primary bibliographic entry see Field 3C.
W74-08763

ORGANIC MANAGEMENT REDUCES LEACHING OF NITRATE,
For primary bibliographic entry see Field 5G.
W74-08773

COMPARATIVE STUDY ON THE INTERACTIVE EFFECT OF QUALITIES OF IRRIGATION WATER AND FERTILIZER LEVELS ON THE YIELD OF WHEAT GROWN ON DIFFERENT SOILS,
Udaipur Univ. (India). Coll. of Agriculture.
P. Lal, and K. S. Singh.
Z. Acker-Pflanzenbau, Vol 136, No 4, p 302-308, 1972.
Identifiers: Comparative studies, Electrical conductivity, *Fertilizers, *Irrigation water, *Sodium adsorption ratio, Soils, *Wheat, Crop production.

Grain and straw yields decreased with increasing levels of electrical conductivity (EC) or Na adsorption ratio (SAR) of irrigation water, but at every level of EC or SAR of irrigation water, better yields were obtained with the higher dose of fertilizers than with the lower dose. Fertilization tended to offset the adverse effect of higher level of EC or SAR of water. The effect of fertilization decreased as the level of EC and SAR of water increased. Reduction in yields with an increase in salt concentration of irrigation water was small on sandy and loamy sand soils as compared to sandy loam and loam soils.--Copyright 1973, Biological Abstracts, Inc.
W74-08779

ASPECTS OF WATER POLLUTION IN FERTILISER INDUSTRY,
Central Public Health Engineering Research Inst., Nagpur (India).
For primary bibliographic entry see Field 5C.
W74-08791

INTERACTION EFFECTS OF BORON AND LIME ON BARLEY,
Department of Agriculture, Charlottetown, (Prince Edward Island). Research Station.
U. C. Gupta.
Soil Science Society of America Proceedings, Vol 36, No 2, p 332-334, March-April, 1972. 3 tab, 15 ref.

Descriptors: *Nutrient requirements, *Trace elements, *Boron, *Toxicity, Crop response, *Barley, Salts, Salinity, *Lime.

A greenhouse study involving six levels of B and four levels of lime was conducted on barley. Boron toxicity symptoms occurred at 0.5 to 4.0 ppm applied B, with the most severe symptoms occurring at 4.0 ppm B level at soil pH 5.3. At 0.5 ppm B, no visible symptoms occurred at pH values of 6.3 and 6.8, and at 1.0 ppm B no symptoms occurred at pH 6.8. There was a highly significant soil pH x B interaction, in which high rates of B were more detrimental to kernel yields at lower pH than at high pH values. The highest kernel yields were recorded with 0.25 ppm B at soil pH 5.8. An application of 4.0 ppm B at soil pH 5.3 and 5.8 did not produce any kernels. A range in the B concentration of 1.4 to 9.9 ppm and in Ca/B ratio of 343 to 1,159 in the boat stage tissue (b.s.t.) collected from Prince Edward Island fields indicated a deficiency of B in many soils for growing barley. However, no visible B deficiency symptoms were found either under greenhouse or field conditions. (Skogerboe-Colorado State)
W74-08799

TYPES OF IRRIGATION SYSTEMS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
R. E. Sneed.
Irrigation Journal, Vol 23, No 5, p 6-9, September-October, 1973.

Descriptors: *Irrigation, *Irrigation systems, Irrigation practices, Application equipment, Distribution systems, Irrigation systems, *History.

A brief history of irrigation is presented along with census figures of the growth of irrigation in recent years. The types of irrigation systems are discussed. The limitations and requirements of each types are discussed briefly. (Skogerboe-Colorado State)
W74-08800

PLANT WATER STATUS IN RELATION TO CLOUDS,
Georgia Coastal Plain Experiment Station, Tifton.
For primary bibliographic entry see Field 2D.
W74-08801

RESPONSE OF SUBIRRIGATED HAY MEADOWS TO THE APPLICATION OF NITROGEN, PHOSPHORUS, AND SULFUR,
Nebraska Univ., Concord. Northeast Station.
G. W. Rehm, W. J. Moline, R. C. Sorensen, and D. F. Burzlaff.
Agronomy Journal, Vol 65, No 4, p 665-668, July-August, 1973. 4 fig, 7 tab, 7 ref.

Descriptors: *Fertilizers, *Nitrogen, *Phosphorus, Fertility, Hay, Yield equations, *Sulfur, *Grasses, Nutrients.

A study was designed to evaluate the effect of five rates of N, P and S on the yield and grass-legume composition of subirrigated meadows. Forage yields were recorded and separations made to determine grass-legume composition. Yields increased linearly with applied N while the response to P was curvilinear. There was no response to S. The percentage of grass in the meadows increased with applied N. Legume percentages increased with added P. Grass yields showed a linear increase with applied N and a curvilinear response to added P. Legume yields decreased linearly at low P rates when high rates of N were applied but increased curvilinearly as P rates were increased. Throughout the study, combinations of N and P produced the highest yields, thus demonstrating the importance of the combination of these two nutrients for maximum production from subirrigated hay meadows. (Skogerboe-Colorado State)
W74-08802

EFFECT OF SUPPLEMENTAL WATER ON BARLEY AND CORN PRODUCTION IN A SUB-HUMID REGION,
Agricultural Research Service, Northern Great Plains Research Center. Mandan, N.D.
J. F. Power, J. J. Bond, W. A. Sellner, and H. M. Olson.
Agronomy Journal, Vol 65, No 3, p 464-467, May-June, 1973. 1 fig, 4 tab, 6 ref.

Descriptors: *Irrigation, *Irrigation practices, *Supplemental irrigation, Irrigation programs, Irrigation effects, *Corn(Field), *Barley.

A 3-year field experiment was conducted on a loam soil in eastern North Dakota to determine the effect of supplemental water, added in various quantities and at different times, on malting barley and corn silage production. Irrigation consisted of (a) none; (b) after previous harvest only (to fill 120-cm profile); (c) 6 cm applied per irrigation as needed during growing season; (d) after previous harvest plus 6 cm at anthesis; (e) after previous harvest plus 6 cm applied as needed during the growing season; and (f) after previous harvest plus 9 to 12 cm applied as needed during the growing season. Water added after harvest was not reflected in soil water content by seeding time the following spring or in increased crop yields, indicating that fall irrigation was of little value. A linear regression existed between total water use and both barley grain and corn silage production, with no distinct differences between the six water treatments evident. (Skogerboe-Colorado State)
W74-08803

DEVELOPMENT OF AUTOMATED SURFACE IRRIGATION,
Department of Agriculture, Lethbridge (Alberta). Research Station.
K. Pohjakas.
Canadian Agricultural Engineering, Vol 14, No 2, p 72-74, December, 1972.

Descriptors: *Irrigation practices, *Irrigation systems, *Automation, Automatic control, Surface irrigation, Furrow irrigation, Border irrigation, Irrigation.

Surface irrigation by manual methods, because of its high labor requirement, is rapidly being replaced by automated sprinkler irrigation. Various gates, valves, dams, and weirs have been developed that, when used, enable a surface irrigation system to function automatically or by remote control. These components must be reliable, inexpensive, and simple to operate. Hardly any of the recently developed components are being manufactured for commercial use. Automated equipment can reduce the labor requirement of the traditional surface irrigation. Further developmental work, field testing, and commercial production of automatic water control devices are necessary to make surface irrigation competitive with other more automatic systems of irrigation. (Skogerboe-Colorado State)
W74-08804

YIELD RESPONSE OF SOYBEAN VARIETIES GROWN AT TWO SOIL MOISTURE STRESS LEVELS,
Ohio Agricultural Research and Development Center, Wooster.
H. J. Mederski, and D. L. Jeffers.
Agronomy Journal, Vol 65, No 3, p 410-412, May-June, 1973. 2 tab, 12 ref.

Descriptors: *Irrigation, *Irrigation practices, *Soil moisture, *Crop response, *Soybeans, Stress, Droughts.

Eight soybean varieties in each of four maturity groups were grown to maturity at optimum and deficient soil moisture conditions to determine differences in varietal response to soil stress. A significant variety by stress level interaction on seed yield was detected among varieties in each of four maturity groups, indicating that the effect of soil moisture stress on yield varied among varieties. Under high moisture stress conditions, the yield of the most stress-resistant varieties was reduced about 20%, while the yield of the least stress-resistant varieties was reduced about 40%. Under conditions of optimum soil moisture, the difference in yield among varieties was large relative to the difference in yield produced under deficient moisture conditions. A low or nonstress soil moisture level permits greater genotypic expression, thereby increasing genotypic variance among varieties. A low soil moisture stress environment appears to be the optimum environment for selecting soybean yield attributes. (Skogerboe-Colorado State)
W74-08805

PIMA COTTON LINT YIELD AS INFLUENCED BY IRRIGATION SCHEDULE, CULTIVAR AND ALTITUDE,
Agricultural Research Service, Phoenix, Ariz.
D. L. Kittock.
Agronomy Journal, Vol 65, No 3, p 498-501, May-June, 1973. 4 fig, 2 tab, 9 ref.

Descriptors: *Irrigation, *Irrigation practices, *Crop response, *Cotton(Field), Water conservation, Yield equations.

Development of heat tolerant cultivars of American Pima cotton made it desirable to re-evaluate irrigation practices for hot climates. To accomplish this, two cultivars and one experimental strain were tested over a period of 6 years at two altitudes and under several irrigation regimes. There were three basic irrigation regimes and several modifications of them. The regime were: wet, irrigate every 7 to 12 days; medium, 14 to 17 days; and dry, 21 to 28 days. Individual irrigations were added in amounts necessary to refill the soil profile. At high altitude, the heat tolerant cultivar, 'Pima S-4', did not differ in water requirement from the non-heat tolerant cultivar, 'Pima S-3'. Both cultivars obtained maximum lint production with a total of 80 cm of water or five post-emergence irrigations. At low altitude, Pima S-4 yielded higher and required more water than Pima S-3. (Skogerboe-Colorado State)
W74-08807

REFLECTANCE, TRANSMITTANCE, AND ABSORPTANCE OF LIGHT BY SUBCELLULAR PARTICLES OF SPINACH (SPINACIA OLERACEA L.) LEAVES,
Agricultural Research Service, Weslaco, Tex.
H. W. Gausman.
Agronomy Journal, Vol 65, No 4, p 551-553, July-August, 1973. 2 fig, 16 ref.

Descriptors: *Photosynthesis, *Reflectance, Chlorophyll, Energy conversion, Plant physiology, *Absorption.
Identifiers: *Spinach.

Subcellular particles of spinach leaves were differentially sedimented and resuspended in a buffered sucrose solution. A spectroreflectometer was used to measure R and transmittance (T) over the 500- to 2,500-nm wavelength interval (WLI) on replicated aliquots of five preparations: buffered sucrose solution; chloroplast preparation; S1, sediment of chloroplast preparation supernatant; S2, sediment of S1 supernatant; and S3, sediment of S2 supernatant. All suspensions of particulates caused less R than the buffered sucrose solution over the 500- to 650-nm WLI. The chloroplast preparation, compared with the buffered sucrose solution, increased R over the 750- to 950-nm WLI. The chloroplast preparation, compared with the buffered sucrose solution, S2, and S3, decreased T over the 500- to 1,250-nm WLI; S1 decreased T over the 500- to 900-nm WLI. A conclusion was reached that subcellular particles in leaves contribute to the R and A of IR light. (Skogerboe-Colorado State)
W74-08809

IONIC BALANCE FOR BARLEY AS INFLUENCED BY P FERTILITY, WATER, AND SOIL TEMPERATURE,
Agricultural Research Service, Northern Great Plains Research Center. Mandan, N. Dak.
R. F. Follett, and G. A. Reichman.
Agronomy Journal, Vol 65, No 3, p 477-482, May-June, 1973. 4 fig, 1 tab, 23 ref.

Descriptors: *Nutrient removal, *Leaching, *Phosphorus, *Barley, Ion transport, Fertility, *Fertilizers, Soil water, Soil temperature.

The relationship between organic anion concentration and yield of spring barley was investigated in a growth room at three levels of P. This relationship was tested at three levels of available soil water (W) and three soil temperatures (T). The concentration of organic anions was determined as the difference between the sum of the meq/kg of inorganic cations and the sum of the meq/kg of inorganic anions. A normal organic anion (C-A) concentration was considered to be that giving optimal growth. In this study, P was more important for obtaining a normal (C-A) than either W or T. Phosphorus increased yields, decreased (C-A) to near normal, and decreased the adverse effects of low W and low T. The large differences in (C-A) between treatments suggests that, under adverse conditions, organic anions may serve as reservoirs of useful metabolites. (Skogerboe-Colorado State)
W74-08810

WATER STRESS RELATIONS OF THE POTATO PLANT UNDER FIELD CONDITIONS,
Agricultural Research Service, Orono, Maine.
E. Epstein, and W. J. Grant.
Agronomy Journal, Vol 65, No 3, p 400-404, May-June, 1973. 9 fig, 15 ref.

Descriptors: *Soil moisture, *Crop response, *Potatoes, Water requirements, Water utilization, Stress, *Maine.

Potatoes grown in northern Maine are often subjected to extensive periods of drought. The objective of this study was to examine the physiological response of potatoes to soil water stress. Relative water content, leaf diffusive resistance, and tuber water potential of two potato varieties were measured under irrigated and nonirrigated conditions. There were pronounced differences in relative water content, leaf diffusive resistance, and tuber water potential as a result of irrigation. Relative water content (RWC) of plant leaves correlated well with soil water potential but poorly with leaf diffusive resistance. The two potato varieties differed in RWC when soil water potential was high. Tuber water potential correlated well with RWC and soil water potential. Similarity between tuber water potential and the RWC data suggested that the potato plant exhibits water stress when the soil water potential drops below-0.25 bar. (Skogerboe-Colorado State)
W74-08811

COTTON LEAF TEMPERATURES AS RELATED TO SOIL WATER DEPLETION AND METEOROLOGICAL FACTORS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
W. L. Ehrler.
Agronomy Journal, Vol 65, No 3, p 404-409, May-June, 1973. 4 fig, 3 tab, 9 ref.

Descriptors: *Irrigation, *Irrigation practices, *Crop response, *Cotton, Soil moisture, Tension, *Soil water.

In two field experiments with cotton, the relation between moderate soil water depletion and leaf-air temperature difference (Delta T) was investigated for feasibility of measurement and possible use as

a guide to irrigation scheduling. Hourly temperatures of the upper leaves and of the air 1 m above the canopy were obtained for three cultivars of short-staple cotton and one of long-staple. In addition, hourly measurements were made of the vapor pressure 1 m above the crop. These data were taken during six irrigation cycles extending over two summers and encompassing a wide range of saturation deficit (SD). The temperature differences were measurable and predictable. When the SD remained steady from day to day, the mean daytime Delta T decreased 1 C on the day of irrigation and an additional degree the next day owing to leaf rehydration and consequent stomatal opening. (Skogerboe-Colorado State)
W74-08812

EFFECT OF LONG-TERM MANAGEMENT ON PHYSICAL AND CHEMICAL PROPERTIES OF THE COSHOCTON WATERSHED SOILS,
Agricultural Research Service Coshocton, Ohio. North Appalachian Experimental Watershed.
For primary bibliographic entry see Field 4D.
W74-08813

1973 IRRIGATION SURVEY.
Irrigation Journal, Vol 23, No 6, p 11-20, November-December, 1973.

Descriptors: *Irrigation, *Irrigation practices, Irrigation systems, *Surveys, Reviews.

A state-by-state summary is presented of irrigated acreage for selected years since irrigation was begun in the state. The following data are also given: percent change per year, amount sprinkled, type of power used by percent, method of irrigation, irrigated acreage by crop, and amount irrigated by gravity. (Skogerboe-Colorado State)
W74-08817

CONTROLLED SPRINKLER IRRIGATION SYSTEM FOR EQUALIZED WATER DISTRIBUTION DEVELOPED IN ISRAEL.
Rhodesia Agricultural Journal, Vol 69, No 4, p 75-76, July-August, 1972. 2 fig.

Descriptors: *Irrigation practices, *Distribution systems, Irrigation systems, *Sprinkler irrigation, Application equipment, Irrigation efficiency.
Identifiers: *Israel.

A new irrigation system has been developed in Israel to achieve maximum controlled water distribution on permanent set sprinkler schemes. Equalized water distribution with the new sprinkler offers the obvious advantage of ensuring against over-saturating areas served by the first sprinklers or under-irrigating the last points in the network. It prevents water wastage resulting from over-discharge in the first units to compensate for the loss caused by the drop of pressure--up to 20 percent--as the result of friction over the length of the irrigation pipe and changes in topography experienced in conventional systems. The savings in water due to complete regulation of the outflow of each sprinkler is said to range from five to 15 percent of the total water use for a given plot, depending upon pressure and topographical conditions. These are low discharge sprinklers designed for use in all types of fruit orchards for under-the-foliage fixed irrigation. (Skogerboe-Colorado State)
W74-08818

NITROGENOUS COMPOUNDS IN THE ENVIRONMENT.
Environmental Protection Agency, Washington, D.C. Hazardous Materials Advisory Committee.
For primary bibliographic entry see Field 5B.
W74-08835

SOIL CRUSTING RELATED TO SPRINKLER INTENSITY,
Auburn Univ., Ala. Dept. of Agricultural Engineering.
C. D. Busch, E. H. Rochester, and C. L. Jernigan.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, no 4, p 808-809, 1973. 5 fig, 2 tab, 10 ref. OWRR A-025-ALA(1).

Descriptors: *Sprinkler irrigation, *Soil strength, *Soil density, *Regression analysis, *Irrigation practices, Rainfall, Soil texture, Rain gages, Rainfall simulators.
Identifiers: *Soil crusting, Penetrometer.

Investigations of sprinkler intensities and their influence on crust strength after one and repeated irrigation cycles were made. Regression analyses were done correlating penetrometer readings of crust strength and crust moisture data. Preliminary results showed that previous sprinkling can reduce strength of crust formed by a subsequent rainfall. Other results showed that lower sprinkler intensities consistently produced a weaker crust, and that increasing numbers of water application cycles failed to show a consistent influence on crust strength. (Mastic-Arizona)
W74-08844

BORON RELEASE FROM DEIONIZERS,
California Univ., Los Angeles. Dept. of Environmental Horticulture.
For primary bibliographic entry see Field 5B.
W74-08873

A COMPUTER SIMULATION OF CORN GRAIN PRODUCTION,
Missouri Univ., Columbia. Dept. of Agronomy.
C. H. Baker, and R. D. Horrocks.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 6, p 1027-1029, 1031, November-December, 1973. 3 tab, 22 ref.

Descriptors: *Computer models, *Mathematical models, *Plant growth, *Corn(Field), Crop response, Model studies, *Crop production, *Simulation analysis.

When the ideal simulation model is pictured, it is evident that the trend of crop research needs to be changed. Instead of researching a plant on a monthly or seasonal basis, it should be considered on a daily basis. The corn plant, like most biological systems, is a highly variable and highly buffered system. A system of this complexity does not respond to average or monthly weather -- instead it is affected each day by that day's weather. The effect of similar weather on two successive days also differs to a degree since the plant has changed. In a month's time, the plant can change many times. Development of a simulation model is not limited by computer capacity, but rather is limited by lack of mathematical definitions for the basic plant processes. (Skogerboe-Colorado State)
W74-08917

TRICKLE IRRIGATION -- APPLICATION UNIFORMITY FROM SIMPLE EMITTERS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
D. A. Bucks, and L. E. Myers.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 6, p 1108-1111, November-December, 1973. 4 fig, 3 tab, 12 ref.

Descriptors: *Irrigation practices, *Surface irrigation, *Application equipment, Uniformity coefficient, Irrigation systems, *Irrigation design, Construction, Design.
Identifiers: *Drip irrigation.

Procedures for design and construction of two multiple-size systems, using a stainless-steel and microtube or spaghetti-tube emitter, were developed. Mean discharge deviations for these simple emitters operated at constant pressure were from 1.7 percent to 3.3 percent for the stainless-steel emitters, and from 1.8 percent to 2.5 percent for the microtube emitters. Performance by a multiple-diameter stainless-steel emitter system designed for row-crop usage verified the practicality of changing emitter diameters along the lateral. The theoretical performance of a 250-foot lateral with a 2-foot emitter spacing, using five sizes of stainless-steel emitters, showed a mean deviation of 1.7 percent and maximum deviations of +5.2 percent to -6.6 percent from design discharge. Actual mean deviation from design discharge was 3.1 percent, with maximum deviations of +8.8 percent to -10.8 percent in the field. (Skogerboe-Colorado State)
W74-08918

EVALUATION OF GRADED FURROW IRRIGATION WITH LENGTH OF RUN ON A CLAY LOAM SOIL,
Agricultural Research Services, Bushland, Tex. Southwestern Great Plains Research Center.
J. T. Musick, W. H. Sletten, and D. A. Dusek.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 6, p 1075-1080, 1084, November-December, 1973. 11 fig, 1 tab, 13 ref.

Descriptors: *Irrigation practices, *Furrow irrigation, *Infiltration rates, Surface irrigation, Runoff, Infiltration, Inflow, *Texas, Soil water, Crop production, *Sorghum, Clay loam.
Identifiers: Graded furrows.

The effects of length of run on water intake, soil water distribution, grain sorghum yields and irrigation water use efficiencies were evaluated on graded furrow irrigated Pullman clay loam at Bushland, Texas, in 1961-63 on a 900-foot run and in 1965-66 on an 1,800-foot run. Total water intake during the 15 irrigations studied ranged from 1.3 to 6.0 inches, depending primarily on soil water content at time of irrigation and surface soil consideration. Intake rates after runoff started were affected by length of run. As water advanced down the furrows, an increasing portion of the furrow length reached the basic rate which caused the average rate for the wetted furrow length to decline. (Skogerboe-Colorado State)
W74-08927

RATIONALE FOR OPTIMUM NITROGEN FERTILIZATION IN CORN PRODUCTION,
Agricultural Research Service, Beltsville, Md. Soils Lab.
G. Stanford.
Journal of Environmental Quality, Vol 2, No 2, p 159-166, April-June, 1973. 5 fig, 1 tab, 27 ref.

Descriptors: *Fertilizers, *Fertilization, Fertility, Nutrient removal, Leaching, *Nitrogen, Nitrates, Denitrification, Water pollution sources, Groundwater, *Corn(Field), Optimum development plans.

During the past decade, the percentage of the corn acreage in the USA receiving N fertilizer has risen steadily. By 1971, in the Corn Belt and five adjoining states, this proportion ranged from 93 to 100% of the total corn acreage. Between 1964 and 1970 the average rate of N applied to fertilized acres increased about 83% in the Corn Belt and 128% in adjacent states (Nebraska, Kansas, Michigan, Wisconsin, and Minnesota). Undoubtedly, there has been an accompanying increase in the proportion of the corn acreage receiving optimum to excessive amounts of N fertilizer. These trends emphasize the importance of developing improved procedures for achieving optimum fertilizer N use (i.e., adequate but not excessive rates, and proper timing for greater efficiency) consistent with the goal of minimizing the possibility of environmental pollution. (Skogerboe-Colorado State)
W74-08929

DYNAMIC SIMULATION OF AUTOMATED SUBSURFACE IRRIGATION SYSTEMS,
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
C. H. M. van Bavel, J. Ahmed, S. I. Bhuiyan, E. A. Hiler, and A. G. Smajstrla.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 6, p 1095-1099, November-December, 1973. 6 fig, 1 tab, 6 ref.

Descriptors: *Irrigation practices, *Subsurface irrigation, *Automation, Computer models, Mathematical models, Soil moisture, Soil water, Soil water movement, *Simulation analysis, *Water distribution(Applied), *Water delivery.

Water delivery and distribution from a subsurface irrigation system were simulated for a simplified one-dimensional case. Water loss by surface evaporation and root uptake was taken into account in a manner reflecting its dependence upon depth and time of day. The system was defined as an automatic one, in which the water content at a given depth would turn infiltration from the buried delivery system off and on. The simulation was performed in S/360 CSMP, a dynamic simulation language that appears well adapted for this type of problem. The program is efficient and allows ready substitution of the hydraulic characteristics of the soil, the consumptive use pattern, and the root uptake distribution with depth, as well as geometrical variables. The results that in a Yolo clay loam and with a typical consumptive use and root distribution pattern, an automated system will cycle from a delivery period of about 2 hours through a redistribution period of about 40 hours, while maintaining an essentially constant water content in the root zone, provided the depth of delivery and control are properly chosen. (Skogerboe-Colorado State)
W74-08931

FURROW IRRIGATION CRITERIA FOR HAWAIIAN SUGARCANE,
Hawaiian Sugar Planters' Association Experiment Station, Honolulu.
F. M. Vaziri, H. G. Collins, and W. N. Reynolds.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 99, No IR1, p 1-14, March, 1973. 4 fig, 3 tab, 3 ref.

Descriptors: Irrigation, *Irrigation practices, Furrow irrigation, *Hawaii, Hydraulics, Infiltration, *Sugarcane, Water distribution(Applied), Water control.

Empirical equations describing infiltration, advance, recession, and opportunity time for infiltration were developed by analysis of inflow-outflow-time measurements recorded during furrow irrigation of sugarcane. The measurements represent field conditions at various sugarcane stages on the Molokai soil series. A concept of relating furrow infiltration as a function of furrow length is presented. The development of equations and tables for use in the design and efficient operation of sugarcane furrow irrigation systems in the Hawaiian Islands is described. (Skogerboe-Colorado State)
W74-08932

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, TAOS COUNTY,
New Mexico State Univ., University Park. Dept. of Agronomy.
H. J. Maker, J. J. Folks, and J. U. Anderson.
Available from the National Technical Information Service as PB-233 119, $3.25 in paper copy, $1.45 in microfiche. Agricultural Experiment Station Research Report 268, New Mexico State University, Las Cruces, New Mexico, 1974. 44 p, 1 fig, 7 tab, 8 ref. OWRR B-015-NMEX(24).

Descriptors: *New Mexico, *Irrigable land, *Soil classification, *Land classification, Soil investigations, Agriculture, Irrigation.
Identifiers: *Taos County(N. Mex), *Soil associations, *Irrigation potential, Soil interpretation, Soil characteristics, Soil description.

Information is presented on the suitability of soils in Taos County, New Mexico for irrigation. The acreage, general location, and relative capability of the soils for use in irrigated agriculture are given. The general soil map and a detailed soil survey provided the information necessary for the classification for irrigation. The data were organized and presented on the basis of soil associations shown on the general soil map and on the irrigation land classification map. Taos County has about 1,444,500 acres, of which about 29 percent were considered suitable for irrigation. About 33,600 acres were in irrigation class 1; 200,442 acres in class 2; 136,968 acres in class 3; and 55,044 acres in class 4. The remaining 1,018,446 acres in the county were in land class 6, which was not considered suitable for irrigation. Information also is provided on soil resources that can be used for preliminary planning for irrigated agriculture, forestry, range, urban, engineering, recreation, and wildlife uses. A general soil map and a classification of land for irrigation map, both in color are included. (Hain-New Mexico State)
W74-09054

SUITABILITY OF NEW MEXICO LANDS FOR IRRIGATION,
New Mexico State Univ., University Park. Dept. of Agronomy.
J. U. Anderson, and H. J. Maker.
Available from the National Technical Information Service as PB-233 122, $3.25 in paper copy, $1.45 in microfiche. Agricultural Experiment Station Research Report 276, New Mexico State University, Las Cruces, New Mexico, 1974. 28 p, 12 fig, 1 tab, 5 ref. OWRR B-015-NMEX(25).

Descriptors: *New Mexico, *Irrigable land, Soil classification, Land classification, Soil investigation, Agriculture, Irrigation.
Identifiers: *Soil associations, *Irrigation potential, Soil interpretation, Soil characteristics, Soil description.

Results are summarized of a study which was conducted to obtain the extent, nature, and distribution of irrigable land in New Mexico. Irrigation land classes were assigned to soils on the basis of data obtained from various published and unpublished detailed and reconnaissance soil surveys. The data were organized and presented on the basis of soil associations. New Mexico has about 77,866,400 acres, of which about 41 percent were considered suitable for irrigation. About 3,799,809 (5%) acres were in irrigation class 1; 10,167,058 (13%) acres in class 2; 11,030,216 (14%) acres in class 3; 6,827,297 (9%) acres in class 4. The remaining 46,042,020 acres in the state were in land class 6, which was not considered suitable for irrigation. These figures are in contrast to the 1.5 percent of the state now being irrigated. Information is provided on soil resources to be used for preliminary planning for irrigated agriculture, forestry, range, urban, engineering, recreation and wildlife use. A general suitability map prepared from the county irrigation land classification maps of the 31 county reports previously published is included. (Hain-New Mexico State)
W74-09055

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, MCKINLEY COUNTY,
New Mexico State Univ., University Park. Dept. of Agronomy.
H. J. Maker, H. E. Bullock, Jr., and J. U. Anderson.
Available from the National Technical Information Service as PB-233 121, $3.75 in paper copy, $1.45 in microfiche. Agricultural Experiment Station, Research Report 262, New Mexico State University, Las Cruces, New Mexico, 1974. 68 p, 13 fig, 7 tab, 8 ref. OWRR B-015-NMEX(22).

Descriptors: *New Mexico, *Irrigable land, *Soil classification, *Land classification, Soil investigations, Agriculture, Irrigation.
Identifiers: *McKinley County(N. Mex), *Soil associations, *Irrigation potential, Soil interpretation, Soil characteristics, Soil description.

Information is presented on the suitability of soils in McKinley County, New Mexico for irrigation. The acreage, general location, and relative capability of the soils for use in irrigated agriculture are given. The general soil map based on a reconnaissance soil survey and limited detailed soil surveys provided the information necessary for the classification for irrigation. The data were organized and presented on the basis of soil associations shown on the general soil map and on the irrigation land classification map. McKinley County has about 3,495,000 acres, of which about 42 percent were considered suitable for irrigation. About 86,553 acres were in irrigation class 1; 410,917 acres in class 2; 298,331 acres in class 3; and 654,910 acres in class 4. The remaining 2,044,289 acres in the county were in land class 6, which was not considered suitable for irrigation. Information is also provided on soil resources that can be used for preliminary planning for irrigated agriculture, forestry, range, urban, engineering, recreation, and wildlife uses. A general soil map and a classification of land for irrigation map, both in color, are included. (Hain-New Mexico State)
W74-09056

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, VALENCIA COUNTY,
New Mexico State Univ., University Park. Dept. of Agronomy.
H. J. Maker, C. W. Keetch, and J. U. Anderson.
Available from the National Technical Information Service as PB-233 120, $3.75 in paper copy, $1.45 in microfiche. Agricultural Experiment Station Research Report 267, New Mexico State University, Las Cruces, New Mexico, 1974. 72 p, 13 fig, 7 tab, 11 ref. OWRR B-015-NMEX(23).

Descriptors: *New Mexico, *Irrigable land, *Soil classification, *Land classification, Soil investigations, Agriculture, Irrigation.
Identifiers: *Valencia County(N. Mex), *Soil associations, *Irrigation potential, Soil interpretation, Soil characteristics, Soil description.

Information is presented on the suitability of soils in Valencia County, New Mexico for irrigation. The acreage, general location, and relative capability of the soils for use in irrigated agriculture are given. The general soil map based on a reconnaissance soil survey and limited detailed soil surveys provided the information necessary for the classification for irrigation. The data were organized and presented on the basis of soil associations shown on the general soil map and on the irrigation land classification map. Valencia County has about 3,621,000 acres, of which about 38 percent were considered suitable for irrigation. About 75,357 acres were in irrigation class 1; 477,008 acres in class 2; 531,389 acres in class 3; and 305,140 acres in class 4. The remaining 2,232,206 acres in the county were in land class 6, which was not considered suitable for irrigation. Information also is provided on soil resources that can be used for preliminary planning for irrigated agriculture, forestry, range, urban, engineering, recreation, and wildlife uses. A general soil map and a classification of land for irrigation map, both in color, are included. (Hain-New Mexico State)
W74-09057

SOIL AND WATER CONSERVATION.
For primary bibliographic entry see Field 6E.
W74-09169

PROSPECTIVE COSTS OF ADJUSTING TO A DECLINING WATER SUPPLY: TEXAS HIGH PLAINS,
Economic Research Service, (USDA), Washington, D.C.
For primary bibliographic entry see Field 6D.
W74-09242

EFFECTS OF VARIOUS WATER REGIMES ON STOMATAL AND MESOPHYLL CONDUCTANCES OF BEAN LEAVES,
Akademiya Nauk Estonskoi SSR, Tartu. Institut Fiziki i Astronomii.
H. Moldau.
Photosynthetica (Prague). Vol 7, No 1, p 1-7, 1973. Illus.
Identifiers: *Bean leaves, Defoliation, *Desiccation, Leaves, *Mesophyll conductances, Phaseolus-vulgaris, *Stomatal conductances, Soil flooding.

Soil-grown bean plants (Phaseolus vulgaris L.) were subjected to rewatering after desiccation, partial defoliation and flooding. Subsequent responses of the conductances of the stomata and of the mesophyll were studied in a conditioned leaf chamber under a saturating illuminance and a limiting CO2-supply. The mesophyll conductance remained constant during 4 days of desiccation to -13 bar and during the recovery of the leaf water potential from -13 to -5 bar. Changes in the photosynthetic activity of leaves were solely attributed to changes in the stomatal conductance. Defoliation of a well-watered plant caused no changes in both conductances of the remaining leaves. Defoliation of a desiccated plant resulted in an increase in the stomatal conductance, with the mesophyll conductance remaining constant. Flooding of the soil caused a sharp decrease in both conductances. It is concluded that soil-induced changes of the water deficit of leaves cause no changes in the mesophyll conductance over the whole range of leaf water potentials where stomata usually operate. Flooding of the root system probably brings about an insufficient supply of metabolites (needed for the normal course of the carboxylation reaction) from roots to leaves.--Copyright 1974, Biological Abstracts, Inc.
W74-09247

WATER LOSS FROM AN IRRIGATED SORGHUM FIELD: I. WATER FLUX WITHIN AND BELOW THE ROOT ZONE,
South Dakota State Univ., Brookings. Dept. of Plant Science.
L. R. Stone, M. L. Horton, and T. C. Olson.
Agronomy Journal, Vol 65, No 3, p 492-495, May-June, 1973. 5 fig, 1 tab, 6 ref. OWRR A-018-SDAK(4).

Descriptors: *Soil water, *Soil moisture, *Leaching, Tensiometers, Hydraulic gradient, Hydraulic conductivity, *Sorghum, Irrigation.

Water movement within and below the root zone of a sorghum crop was evaluated during a 31-day field study following water application. Hydraulic potential data from tensiometers placed at eight depths in the soil profile were used to determine the hydraulic gradients. Soil water flux in various depth layers was calculated using the hydraulic potential gradients and the determined hydraulic conductivity vs soil water content relationships. Upward water movement commenced in the 15 to 30 cm layer 3 days following water application and 130 to 150 cm layer after 19 days. The upward water flux into the root reached a maximum of approximately 0.2 cm/day near the end of the study period. During the 31-day study period, 6.0 cm of water were lost from the 150 cm soil profile by flux below the root zone. This illustrates the importance of considering water loss due to flux below the root zone in crop situations. (See also W74-09249) (Skogerboe-Colorado State)
W74-09248

WATER LOSS FROM AN IRRIGATED SORGHUM FIELD: II. EVAPOTRANSPIRATION AND ROOT EXTRACTION,
South Dakota State Univ., Brooking. Dept. of Plant Science.
L. R. Stone, M. L. Horton, and T. C. Olson.
Agronomy Journal, Vol 65, No 3, p 495-497, May-June, 1973. 5 fig, 9 ref. OWRR A-018-SDAK(5).

Descriptors: *Drainage, *Evapotranspiration, *Deep percolation, Soil water, Soil moisture, Tensiometers, Soil water movement, *Sorghum, Irrigation.

A method using tensiometers for obtaining evapotranspiration rates and root extraction patterns within an actively growing sorghum crop is discussed. Profile water depletion was calculated from water content profiles determined using tensiometer readings and laboratory-measured soil water characteristics. Profile water depletion minus flux below the root zone yielded the daily evapotranspiration rate. During the 31-day study, approximately 65% of the total water loss was due to flux loss from the root zone. These data clearly show the importance of considering flux below the root zone when attempting to determine evapotranspiration rates using depletion methods. The method of determining evapotranspiration rates illustrated provides an alternative to the microclimatological and lysimeter methods. (See also W74-09248) (Skogerboe-Colorado State)
W74-09249

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

ECOLOGICAL EQUILIBRIUM OF RIVER-ESTUARY-SEA SYSTEMS AND IMPROVEMENT OF THEIR EFFICIENCY FOR THE NATIONAL ECONOMY (O EKOLOGICHESKOM RAVNOVESII SISTEM REKA-LIMAN-MORE I POVYSHENII IKH NARODNOKHOZYAYSTVENNOY EFFEKTIVNOSTI),
Akademiya Nauk URSR, Odessa. Institut Ekonomiki.
For primary bibliographic entry see Field 2L.
W74-08708

FORECASTING CHANGES IN WATER BALANCE UNDER INFLUENCE OF HUMAN ACTIVITY (PROGNOZIROVANIYE IZMENENIY VODNOGO BALANSA POD VLIYANIYEM KHOZYAYSTVENNOY DEYATEL'NOSTI),
A. G. Bulavko.
Vodnyye Resursy, No 4, p 50-58, 1973. 1 fig, 3 tab, 20 ref.

Descriptors: *Forecasting, *Future planning(Projected), *Water balance, *Human population, Watershed management, Forest management, Land management, Soil management, Land reclamation, Drainage practices, Reservoir construction, Agriculture, Crop production, Runoff, Evaporation.
Identifiers: *USSR(Belorussia).

A forecast of changes in water-balance items in Belorussia resulting from man's activities in watersheds was prepared on the basis of projected plans of development of agricultural production and land reclamation in the Republic. Four types of human activity are considered: (1) changes in forested and plowed areas, (2) intensification of agriculture, (3) drainage practices such as reclamation of bogs and waterlogged soils, and (4) construction of reservoirs. Present streamflow data can be used in planning for water-resources development, since no significant changes are anticipated in the structure of the water balance or in the value and seasonal distribution of runoff in the next 10-15 years. (Josefson-USGS)
W74-08709

MAN-MADE LAKES: THEIR PROBLEMS AND ENVIRONMENTAL EFFECTS,
W. C. Ackermann, G. F. White, E. E. Worthington, and J. L. Ivens.
American Geophysical Union, Washington, D.C. Geophysical Monograph 17. 1973. 847 p.

Descriptors: *Environmental effects, *Artificial lakes, *Multiple-purpose reservoirs, *Lake morphology, Limnology, Hydraulics, Hydrology, Impoundments, Social aspects, Recreation, Africa, Sedimentation, *Aquatic environment.

Presented in this volume are 113 technical papers given at the third International Symposium on Man-Made Lakes, held in Knoxville, Tennessee, in 1971, organized by the International Council of Scientific Unions. Topics were divided into sessions covering opportunities and environmental effects, Man-made lakes of the world, Case studies of major artificial lakes, Reservoirs as physical systems, Limnology and biologicql systems, Reservoirs in relation to man, and Management for multiple use. Questions addressed were how man-made lakes differ from natural lakes and from place to place, and how man functions as a part of the new ecosystem as it goes through its several stages of development. There is emphasis on African lakes such as Kainji, Volta, Kariba, and Nasser. A comprehensive summary and recommendations section synthesizes the complex relationships and choices by the participants, and offers a number of guidelines designed to be useful in future decisions relating to this method of altering the natural ecosystem. (See W74-08748 thru W74-08752) (Paylore-Arizona)
W74-08747

LAKE MEAD, A CASE HISTORY,
Bureau of Reclamation, Denver, Colo.
D. A. Hoffman, and A. R. Jonez.
In: Man-Made Lakes: Their Problems and Environmental Effects, Geophysical Monograph 17, American Geophysical Union, Wash. D.C., 1973. W. C. Ackermann, G. F. White, and B. Worthington, editors, p 220-233, 9 fig, 1 tab, 1 append, 15 ref.

Descriptors: *Density currents, *Sedimentation, *Ecosystems, *Colorado River Basin, Dams, Lake morphology, Geologic history, Arid lands, Water quality, Earthquakes, Climatology, Limnology, Hydrology, Hunting, Fishing, Recreation, *Arizona, *Nevada, Stratification.
Identifiers: *Lake Mead, Hoover Dam, Lake Powell, Las Vegas Wash, Black Canyon, Lake Mead National Recreation Area, Virgin River basin.

A history of Lake Mead, formed by Hoover Dam in the arid Black Canyon of the Colorado River is presented. Subjects include geologic aspects, limnology, ecology, hydrology, history of man in the area, and recreation. Research is needed in the biology and ecology of the reservoir: circulation patterns in relation to Lake Powell; the cause of regime of low dissolved oxygen layers during stratification; and the effect of development in the Las Vegas Wash and Virgin River basins on water quality of Lake Mead. (See also W74-08747) (Mastic-Arizona)
W74-08748

LAKE NASSER,
Lake Nasser Development Centre, Aswan, (Egypt).
P. C. Raheja.
In: Man-Made Lakes: Their Problems and Environmental Effects, Geophysical Monograph 17,

Amer. Geophysical Union, Washington, D.C., 1973, W. C. Ackermann, G. F. White, and E. B. Worthington, editors, p 234-245, 3 fig, 1 tab.

Descriptors: *Aquatic environment, *Multiple-purpose reservoirs, *Lake morphology, Limnology, Meteorology, Ecosystems, Fisheries, Irrigation, Transportation, Tourism, Locks.
Identifiers: *Aswan High Dam, *Lake Nasser, *U.A.R.(Egypt).

Knowledge, development problems, and opportunities are summarized for Lake Nasser reservoir impounded by the Aswan High Dam in Egypt. Highlights include descriptions of physical data, the biological system, and the relationship to man's activities, including the fishing industry, agriculture, transportation, tourism, public health, and scientific activities an economic analysis summary is presented of pre-investment for multiple-use management and development of resources. (See also W74-08747) (Mastic-Arizona)
W74-08749

SEEPAGE LOSSES FROM LAKE NASSER,
High Dam Authority, Cairo (Egypt).
T. A. Wafa, and A. H. Labib.
In: Man-Made Lakes: Their Problems and Environmental Effects, Geophysical Monograph 17, Amer. Geophysical Union, Washington, D.C., 1973, W. C. Ackermannn, G. F. White, and E. B. Worthington, editors, p 287-291, 2 tab.

Descriptors: *Seepage, *Water level recorders, *Boreholes, Seepage control, *Porosity, Permeability, Aquifers, Reservoirs, Sandstones, Evaporation, Faults(Geologic), Groundwater, Piezometers, Bank Storage, Water table, Hydraulic gradient, Outlets, Inlets(Waterways).
Identifiers: *Aswan High Dam, *Lake Nasser, *U.A.R.(Egypt).

Before the construction of the Aswan High Dam forming Lake Nasser, average seepage losses were estimated to be 1000 million cu/m per year. Following construction, investigations were undertaken to confirm or correct the estimate. In total, 29 shallow bore holes and 5 deep research bore holes were drilled, of which 23 of the shallow and all the deep bore holes were completed as piezometers and were equiped with automatic water level recorders. Results showed the porosity of the overall bedding to be approximately 25 percent. Evidence of at least two groundwater aquifers in the Nubian sandstone was found, but only the upper unconfined aquifer is affected by the riverbed, while the deep confined aquifer is recharged mainly from the Eastern Desert. Investigations also showed that water seeping from the banks of the Nile below the Dam is the result of seepage loss along the banks of the reservoir. The expected seepage losses appear to have been reasonably estimated, based on present data, but studies are being continued, particularly the monitoring of flow at the inlet and outlet. (See also W74-08747) (Mastic-Arizona)
W74-08750

FALL AND RISE OF LAGO DEL ORO,
Dept. of Civil Engineering, Knoxville. Tennessee Univ.,
R. L. A. De Jong.
In: Man-Made Lakes: Their Problems and Environmental Effects, Geophysical Monograph 17, American Geophysical Union, Washington, D.C. 1973, W. C. Ackermann, G. F. White, and E. B. Worthington, editors, p 292-294.

Descriptors: *Dam design, *Soil mechanics, *Reservoir construction, *Reservoir leakage, *Project post-evaluation, Runoff, Streambeds, Recreation seepage, Spillways, Grouting, Slurries, Sealants, Impoundments, *Arizona.

Water-holding problems were studied in the Lago Del Oro reservoir near Tucson, Arizona. Hydrologic observations showed evidence of excess seepage. Further investigations showed that problems stemmed from inadequate clay core depth, a poor seal between upper and lower clay core sections, and on one side of the reservoir bottom, conglomerate containing several old buried stream channels with occasional outcroppings in the reservoir bottom. A number of corrective measures were tested including clay slurry, chemical sealants, grouting, modification of soil distribution in the reservoir, and a clay blanket. A combination of the last two has been the most economical dependable measure. Problems encountered point out the need for comprehensive studies prior to construction of dam and reservoir projects. (See also W74-08747) (Mastic-Arizona)
W74-08751

ECOSYSTEM OF THE SALTON SEA,
California State Univ., Long Beach. Dept. of Microbiology.
J. Kim.
In: Man-Made Lakes: Their Problems and Environmental Effects, Geophysical Monograph 17, American Geophysical Union, Washington D.C., 1973, W. C. Ackermann, G. F. White, and E. B. Worthington, editors, p 601-605. 14 ref.

Descriptors: *Saline lakes, *Salinity, *Water pollution sources, *Agricultural chemicals, Marine microorganisms, Salts, Halophilic animals, Fish, Population, Pollutants, Algae, Plankton, Nutrients, Marine bacteria, Irrigation canals, Desalination, Chlorides, Sinks, Hydrogen ion concentration, *California, Ecosystems.
Identifiers: *Salton Sea.

The ecosystem of the Salton Sea, a saline lake in southeastern California, is threatened with destruction as a result of increasing salinity and pollution of the lake. Having no outlet, the Salton Sea is a sink collecting large amounts of treated and untreated sewage from surrounding communities, agricultural chemicals and fertilizers, and natural drainage water containing nutrients and salts which are left in residual form. Chlorosities will reach the critical range for fishery and water contact sports by 1980. Each year a sudden massive die-off of millions of fish occurs due principally to toxic algae poisoning. Recommendations are cited, but emphasis is on the need to control the inflow of sewage and agriculture chemicals particularly, in addition to control of increasing salinity. (See also W74-08747) (Mastic-Arizona)
W74-08752

PREDICTING THE HYDROLOGIC EFFECTS OF LAND MODIFICATIONS,
Arizona Univ., Tucson.
M. M. Fogel, L. Duckstein, and C. C. Kisiel.
Paper no. 73-250 for presentation at 1973 meeting of American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973. 14 p, 5 fig, 1 tab, 22 ref. OWRR B-032-ARIZ (5).

Descriptors: *Forecasting, *Stochastic processes, *Peak discharge, *Hydrologic data, *Simulation analysis, Water yield, Sediment yield, Watershed management, Precipitation(Atmospheric), Evaporation, Small watersheds, Storm runoff, Unit hydrographs.
Identifiers: Hydrologic forecasting.

A methodology that can be used to predict long-term hydrologic effects of land modifications on ungaged watersheds is presented. An event-based stochastic model of precipitation provides input into a deterministic watershed model that transforms the inputs into desired hydrologic data such as water yield, peak runoff rate, and sediment yield. The Soil Conservation Service method is used to transform rainfall into runoff. On a large scale, the procedure can be used to determine watershed treatment effects on the optimum size of a floodwater retarding structure. The model is designed to reduce uncertainties in the current practice of implying that rainfall and runoff have similar frequency distributions. The model also provides flexibility in that elevation effects can be accounted for, the distribution function of mean areal rainfall can be utilized, the probability density function of runoff can be obtained, and simultaneous synthetic sets of rainfall, runoff, and soil moisture can be generated for more detailed hydrologic investigations. (Mastic-Arizona)
W74-08753

THE RELEASE OF WATER FROM FOREST SNOWPACKS DURING WINTER,
Forest Service (USDA), Ogden, Utah. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 2C.
W74-08761

TYPES OF IRRIGATION SYSTEMS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W74-08800

1973 IRRIGATION SURVEY.
For primary bibliographic entry see Field 3F.
W74-08817

CONTROLLED SPRINKLER IRRIGATION SYSTEM FOR EQUALIZED WATER DISTRIBUTION DEVELOPED IN ISRAEL.
For primary bibliographic entry see Field 3F.
W74-08818

PROMOTING ENVIRONMENTAL QUALITY THROUGH URBAN PLANNING AND CONTROLS,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 5G.
W74-08828

CONTROLLED INSTANTANEOUS APPLICATION OF FREE WATER TO A POROUS SURFACE,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W74-08883

DEVELOPMENT AND FUTURE OF DREDGING,
Corps of Engineers, Atlanta, Ga. South Atlantic Div.
For primary bibliographic entry see Field 5G.
W74-08893

FLOW TOWARD PERIODIC TITLE DRAINS,
Wisconsin Univ., Milwaukee. School of Architecture.
For primary bibliographic entry see Field 2F.
W74-08923

WATER LAW AND THE HYDROLOGIC CYCLE: A TEXAS EXAMPLE,
Texas Tech Univ., Lubbock. Dept. of Geography.
For primary bibliographic entry see Field 6E.
W74-08930

DYNAMIC SIMULATION OF AUTOMATED SUBSURFACE IRRIGATION SYSTEMS,
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
For primary bibliographic entry see Field 3F.
W74-08931

FURROW IRRIGATION CRITERIA FOR HAWAIIAN SUGARCANE,
Hawaiian Sugar Planters' Association Experiment Station, Honolulu.
For primary bibliographic entry see Field 3F.
W74-08932

THE DEMOGRAPHIC, POLITICAL, AND ADMINISTRATIVE SETTING,
Florida Univ., Gainesville. Urban Studies Bureau.
For primary bibliographic entry see Field 6B.
W74-09058

HYDROGRAPHY AND BEACH DYNAMICS,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
For primary bibliographic entry see Field 6B.
W74-09059

PROBLEMS OF THE REGIME AND INVESTIGATION OF LAKES AND RESERVOIRS (VOPROSY REZHIMA I ISSLEDOVANIYA OZER I VODOKHRANILISHCH),
Gosudarstvennyi Gidrologicheskii Institut, Lenigrad (USSR).
For primary bibliographic entry see Field 2H.
W74-09100

THE UPPER HUDSON WHITEWATER OR WASHWATER,
For primary bibliographic entry see Field 6D.
W74-09137

LITTLE CALUMET RIVER FLOOD CONTROL COORDINATING COMMISSION.
For primary bibliographic entry see Field 6E.
W74-09144

PROTECTION AND IMPROVEMENT OF WATERS.
For primary bibliographic entry see Field 6E.
W74-09149

NATURAL AND SCENIC RIVERS SYSTEM.
For primary bibliographic entry see Field 6E.
W74-09150

WHAT CONSTITUTES PUBLIC WATERWAYS AND RIGHTS.
For primary bibliographic entry see Field 6E.
W74-09151

DIVERSION OF WATER.
For primary bibliographic entry see Field 6E.
W74-09155

SOME NEW METHODS OF TOPOLOGIC CLASSIFICATION OF CHANNEL NETWORKS,
IBM Thomas J. Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 8B.
W74-09221

THE BIRCHWOODS OF MONTANE DAGESTAN (IN RUSSIAN),
Dagestanskii Gosudarstvennyi Universitet, Makhachkala (USSR).
P. L. L'Vov.
Bot Zh, Vol 58, No 1, p 106-113, 1973.
Identifiers: Alder, Birch, *Birchwoods, Conservation, *Montane regions, Oak, Rhododendron-luteum, *USSR(Dagestan-montane).

Species composition of mixed and pure birchwoods was studied in the 3 geomorphological regions of Daghestan (Russian SFSR, USSR): intramontane, extramontane and high mountain. Only in the high mountain region is the subalpine forest zone clearly defined, characterized by successively alternating subalpine sparse woods and subalpine dwarf shrubs. In intermontane Daghestan, the subalpine forest zone is characterized only by sparse birchwoods, while in the extramontane regions, by birch, oak, occasionally alder, and thickets of Rhododendron luteum. These differences are related to characteristics of each geomorphological region (altitude above sea level, presence or absence of glaciers, amount of precipitation, rock composition). In addition, in all 3 regions, subalpine elements dominated in the grassy covering of the birch groves. The birchwoods of Daghestan play an important role in preventing soil erosion, affect mountain streams, are economically valuable and must therefore be protected from exploitation.--Copyright 1974, Biological Abstracts, Inc.
W74-09232

4B. Groundwater Management

ESTIMATION AND MAPPING OF RATES OF EXCHANGE OF FRESH GROUNDWATER IN THE BALTIC ARTESIAN BASIN (OTSENKA I KARTIROVANIYE TEMPOV VODOOBMENA PRESNYKH PODZEMNYKH VOD (NA PRIMERE PRIBALTIYSKOGO ARTEZIANSKOGO BASSEYNA)),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 2F.
W74-08705

SEEPAGE LOSSES FROM LAKE NASSER,
High Dam Authority, Cairo (Egypt).
For primary bibliographic entry see Field 4A.
W74-08750

GROUNDWATER RECHARGE FROM A PORTION OF THE SANTA CATALINA MOUNTAINS,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
For primary bibliographic entry see Field 2F.
W74-08764

COMPETITIVE GROUNDWATER USAGE FROM THE NAVAJO SANDSTONE,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
F. H. Dove, and T. G. Roefs.
In: Hydrology and Water Resources in Arizona and the Southwest, Proc. of the 1973 meetings of the Arizona Section-AWRA, and the Hydrology Section-Arizona Academy of Science, May 4-5, 1973, Tucson, Arizona, p 124-135, (1973). 3 fig, 3 tab, 10 ref.

Descriptors: *Groundwater, *Pumping, *Computer models, Aquifers, Wells, *Sandstones, *Drawdown, Water table, Hydraulic conductivity, Artesian aquifers, Groundwater recharge, Potentiometric level, Artesian head, *Arizona, Simulation analysis.
Identifiers: *Navajo Sandstone groundwater(Ariz), Slurry pumping.

Computer modeling of the Navajo Sandstone groundwater system is used to determine the relationship between mining pumping and declines in the potentiometric surface at locations within the Navajo and Hopi Indian communities. The computer simulation developed is a modified version of the basic artesian aquifer routine used by the Illinois State Water Survey. Assuming no abnormal leakage paths, mining usage will not appreciably affect Indian wells located in the Mesa-verde formation. Theoretical drawdown estimates can be made for locations in the artesian and unconfined areas of the Navajo Sandstone. The drawdowns vary from zero to less than 20 percent of the artesian head elevation above the Navajo Sandstone formation in confined areas. (Mastic-Arizona)
W74-08768

NORTHERN ILLINOIS USES STORAGE EFFECTIVELY,
D. P. Fowler.
Energy Pipelines and Systems, Vol 1, No 4, p 46-47, April, 1974.

Descriptors: *Sand aquifers, *Natural gas, *Storage, *Illinois.

The use of natural underground aquifers by the Northern Illinois Gas Co. for storage of natural gas is described. The aquifers are large, water bearing, dome shaped rock layers of porous sandstone. The sandstone spaces hold water much like gigantic sponges. Natural gas is pumped or injected into the sandstone at pressure great enough to push the water aside, and then downward. An overlying layer of impermeable caprock, usually shale or dense limestone keeps the gas from migrating to the surface. As more gas is injected, the shape of the dome provides the unique trapping mechanism. The aquifers deliver as much as 25% of the total gas sold during the winter, and as much as 55% of the gas distributed on an exceptionally cold day. (Merritt-FIRL)
W74-08909

UNSTEADY FLOW TO BOTTOM DRAIN IN BOUNDED AQUIFER,
Northwestern Univ., Evanston, Ill. Technological Inst.
For primary bibliographic entry see Field 2F.
W74-08926

WATER LAW AND THE HYDROLOGIC CYCLE: A TEXAS EXAMPLE,
Texas Tech Univ., Lubbock. Dept. of Geography.
For primary bibliographic entry see Field 6E.
W74-08930

GEOTHERMICS.
For primary bibliographic entry see Field 2F.
W74-08973

GEOTHERMAL POTENTIAL OF IDAHO,
Idaho Bureau of Mines and Geology, Moscow.
For primary bibliographic entry see Field 2F.
W74-08974

GEOTHERMAL PROSPECTS IN NEW MEXICO,
New Mexico Bureau of Mines and Mineral Resources, Socorro.
For primary bibliographic entry see Field 2F.
W74-08975

GEOTHERMAL RESOURCES OF GUATEMALA, CENTRAL AMERICA,
Instituto Nacional de Electrificacion (Guatemala).
For primary bibliographic entry see Field 2F.
W74-08976

GEOTHERMAL RESOURCES OF COSTA RICA.
Servicio Nacional de Electricidad, San Jose (Costa Rica).
For primary bibliographic entry see Field 2F.
W74-08977

THERMAL AND MINERAL SPRINGS IN UGANDA,
Uganda Geological Survey and Mines Dept., Entebbe.
For primary bibliographic entry see Field 2F.
W74-08978

GEOTHERMAL RESOURCES IN TANZANIA,
Tanzania Mineral Resources Div., Dodoma.
For primary bibliographic entry see Field 2F.
W74-08979

GEOTHERMAL RESOURCES IN INDIA,
Central Water and Power Commission, New Delhi (India).
For primary bibliographic entry see Field 2F.
W74-08980

A PROGRAM FOR THE EXPLORATION OF HIGH TEMPERATURE AREAS IN ICELAND,
National Engineering Authority, Reykjavik (Iceland).
For primary bibliographic entry see Field 2F.
W74-08981

GEOTHERMAL AREAS OF CZECHOSLOVAKIA,
Geoindustria, Prague (Czechoslovakia).
For primary bibliographic entry see Field 2F.
W74-08982

GEOTHERMAL EXPLORATION OF HOT WATER SOURCES IN THE CARPATHIANS OF YUGOSLAVIA AND CZECHOSLOVAKIA,
Scintrex Ltd., Concord (Ontario).
For primary bibliographic entry see Field 2F.
W74-08983

THERMAL FIELDS OF THE EASTERN CARPATHIANS,
Akademiya Nauk URSR, Kiev. Institut Geofiziki.
For primary bibliographic entry see Field 2F.
W74-08984

DEVELOPMENT OF RESEARCH AND UTILIZATION OF GEOTHERMAL RESOURCES IN THE USSR,
Scientific Council on Geothermal Studies, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-08985

GEOTHERMAL RESOURCES OF THE USSR AND PROSPECTS FOR THEIR PRACTICAL USE,
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
For primary bibliographic entry see Field 2F.
W74-08986

THERMAL WATERS OF GEORGIA,
Gruzinskii Politekhnicheskii Institut, Tiflis (USSR).
For primary bibliographic entry see Field 2F.
W74-08987

UTILIZATION OF THERMAL WATERS FROM OIL DEPOSITS OF THE CAUCASUS,
Groznenskii Neftyanoi Institut (USSR).
G. M. Sukharev, S. P. Vlasova, and Y. K. Taranukha.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Part 2, p 1102-1115, 1973. 10 fig, 5 ref.

Descriptors: *Geothermal studies, *Thermal water, Thermal springs, Hot springs, Hydrothermal studies, Thermal power, Hydrogeology.
Identifiers: *Geothermal power, *USSR(Caveasus).

During the exploitation of many gas-oil fields of the Caucasus a great quantity of thermal water is obtained. This water, with great economical effect, is sometimes used for hot water for industrial and agricultural enterprises and for heating commercial services. The development of Middle Miocene deposits over many years led to a considerable decrease of hydrodynamic levels and expansion of cones of depresseions for scores of kilometers. As a result of this there was reduction of yield and even exhaustion on many thermal springs. The most favorable conditions for development of the hydrodynamic system of the Black Mountains, Peredovoy ridges can be created by recovery and injection of 100,000 or 50,000 cu m of water per day. (See also W74-08973) (Knapp-USGS)
W74-08988

RECENT HYDROTHERMAL SYSTEMS OF KAMCHATKA,
Institut Vulkanologii, Petropavlovsk-Kamchatskii (USSR).
For primary bibliographic entry see Field 2F.
W74-08989

GEOLOGY AND GEOTHERMAL POWER POTENTIAL OF THE TATUN VOLCANIC REGION,
Mining Research and Service Organization, Taipei (Taiwan).
For primary bibliographic entry see Field 2F.
W74-08990

RECENT PLANS OF GEOTHERMAL EXPLOITATION,
Japan Metals and Chemicals Co. Ltd., Morioka. Geothermal Power Div.
For primary bibliographic entry see Field 2F.
W74-08991

EXPLOITATION OF THE MATSUKAWA GEOTHERMAL AREA,
Japan Metals and Chemicals Co. Ltd., Morioka. Geothermal Power Div.
For primary bibliographic entry see Field 2F.
W74-08992

THE GEOTHERMAL SYSTEM OF THE KAKONE VOLCANO,
Hot Spring Research Inst. of Kanagawa Prefecture, Hakone (Japan).
For primary bibliographic entry see Field 2F.
W74-08993

TYPES OF COMMERCIAL DEPOSITS OF THERMAL UNDERGROUND WATERS AND SOME VIEWS ON THE ASSESSMENT OF THEIR RESERVES,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoi Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-08994

GEOHYDROLOGY OF THE LAUGARNES HYDROTHERMAL SYSTEM IN REYKJAVIK, ICELAND,
National Energy Authority, Reykjavik (Iceland).
For primary bibliographic entry see Field 2F.
W74-08996

GEOPHYSICAL EXPLORATION THROUGH GEOLOGIC COVER,
For primary bibliographic entry see Field 2F.
W74-09000

GEOTHERMAL PROSPECTING IN SHALLOW HOLES AND ITS LIMITATIONS,
Institute of Applied Geophysics, Prague (Czechoslovakia).
For primary bibliographic entry see Field 2F.
W74-09001

TERRESTRIAL HEAT FLOW IN THE TERRITORY OF CZECHOSLAVAKIA AND THE MEASUREMENT OF THERMAL CONDUCTIVITY WITH FULLY-AUTOMATIC APPARATUS,
Ceskoslovenska Akademie Ved, Prague. Geofyzikalni Ustav.
M. Kresl, and V. Novak.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1261-1265, 1973. 4 fig, 2 tab, 10 ref.

Descriptors: *Geothermal studies, *Heat flow, *Borehole geophysics, Thermal conductivity, Temperature, Instrumentation.
Identifiers: *Geothermal power, *Czechoslovakia.

In Czechoslovakia geothermal measurements have been made since about 1964. A map of the heat flow on the territory of Czechoslovakia was made from more than 40 measurements in the boreholes. For measurement of the thermal conductivity on samples of rocks a fully automatic working apparatus was constructed. For direct measurements of the temperature gradient in boreholes a special probe 2 meters in length was designed, with a sensitivity of 0.01 deg C when measuring the gradient and 0.1 deg C when measuring the absolute temperature. (See also W74-08973) (Knapp-USGS)
W74-09004

GROUND SUBSIDENCE OF A GEOTHERMAL FIELD DURING EXPLOITATION,
Ministry of Works, Wairakei (New Zealand).
J. W. Hatton.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1294-1296, 1973. 3 fig.

Descriptors: *Subsidence, *Withdrawal, *Hydrothermal studies, *Geothermal studies, Thermal power, Water levels, Hydrogeology, Land subsidence.
Identifiers: *New Zealand, Geothermal power.

Ground subsidence in the geothermal field at Wairakei, New Zealand, was first measured in 1956 when bench mark levels were compared with those established in 1950. The area affected by subsidence probably exceeds 25 square miles. The area of maximum subsidence occurs outside the production field. The present maximum subsidence rate in this area is 1.3 feet per annum. Some measurements of horizontal ground movement were made, and a relationship between this surface strain and vertical subsidence has been found. Exploitation of the Wairakei geothermal field has clearly been the major cause of the ground subsidence. At first, a simple relationship between subsidence and aquifer drawdown was evident, indicating elastic ground compression caused by a loss of buoyancy. In more recent years the ground has continued to subside despite a stabilizing of aquifer pressure. Although the region of maximum subsidence occurs outside the production field, the steam transmission pipes and the main concrete hot water drain at Wairakei have been affected by the ground movement. (See also W74-08973) (Knapp-USGS)
W74-09010

PHOTOGRAMMETRIC TECHNIQUES APPLIED IN THE DEVELOPMENT OF GEOTHERMAL RESOURCES IN MATSUKAWA AND OTAKE GEOTHERMAL AREAS USING A VECTOR METHOD,
International Geodetic Survey Inst. Co. Ltd., Tokyo (Japan).
N. Todoki.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1302-1309, 1973. 6 fig, 1 tab, 6 ref.

Descriptors: *Photogrammetry, *Aerial photography, *Structural geology, Geothermal studies, Faults(Geologic), Terrain analysis, Stress, Strain.
Identifiers: *Japan, Geothermal power.

Many fracture zones are observed as linear features (photo-lineaments) in aero photographs. Photo-lineaments are translated and defined as character vector (C.V.). Using such procedures, the position and the depth of the geothermal reservoir in the Matsukawa and Otake areas of Japan were successfully determined. The geothermal zones are controlled by the C. V. oriented NE-SW and NS in Matsukawa area, and NE-SW, EW and NS in Otake, respectively. The distribution of resources shows the presence of various zonal harmonic periodicities. (See also W74-08973) (Knapp-USGS)
W74-09012

CHEMISTRY IN THE EXPLORATION AND EXPLOITATION OF HYDROTHERMAL SYSTEMS,
Department of Scientific and Industrial Research, Wellington (New Zealand). Chemistry Div.
For primary bibliographic entry see Field 2K.
W74-09013

STATICAL INTERPRETATION OF CHEMICAL RESULTS FROM DRILLHOLES AS AN AID TO GEOTHERMAL PROSPECTING AND EXPLOITATION,
Department of Scientific and Industrial Research, Wellington (New Zealand).
In: Proceedings of the osium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1323-1339, 1973. 7 fig, 1 tab, 26 ref, append.

Descriptors: *Geothermal studies, *Hydrothermal studies, *Geochemistry, *Water chemistry, *Statistical methods, Exploration, Heat flow, Thermal water, Mineral water, Boreholes, Thermal springs, Sampling.
Identifiers: *Borehole geochemistry, *New Zealand, Geothermal power.

In prospecting a geothermal field, it is necessary to allow a number of wells to discharge freely to test the potential of the field. Determinations of the concentrations of chloride and silica on water separated from the discharge at atmospheric pressure can be used to give information about the uniformity of the underground water. For this purpose, enthalpy should be plotted against chloride concentrations on paper with lines showing the effects on enthalpy and chloride of loss of steam, dilution, and loss of heat by conduction. When production wells are delivering separated steam to a steam line to the power station, samples of water separated at atmospheric pressure should be analyzed to give information on changes in the underground water supplies to the drillholes. Statistical studies with computer calculation of changes of chloride with time for groups of wells can give average yearly changes of enthalpy, which are much more accurate than changes found from direct enthalpy determinations and also give indications of the reasons for the changes. (See also W74-08973) (Knapp-USGS)
W74-09014

THE BEHAVIOUR OF THE WAIRAKEI GEOTHERMAL FIELD DURING EXPLOITATION,
Ministry of Works, Wellington (New Zealand).
R. S. Bolton.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1426-1439, 1973. 18 fig, 5 ref.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power, *New Zealand.

Since the first bore discharged at Wairakei, New Zealand, in 1951, the total mass drawn from the field up to the middle of 1969 was 660,000,000 tons. Over this period, the rate of discharge has varied considerably from the gradual build up in the early years, to relatively sudden and substantial increses and decreases which have been imposed on the system from time to time. The Wairakei system consists basically of a highly permeable hot water aquifer contained within almost impermeable boundaries. Under exploitation, the dominant influence on the system is the saturation temperature pressure relationship for water, but the withdrawal of steam from the upper levels and the existence of a hot inflow at the lower levels have also played an important part. A satisfactory mathematical model having a predictive ability has not yet been formulated, but from a consideration of the past behavior, in general terms, the power output of the Wairakei station can be sustained at or near its present level for a number of years to come. (See also W74-08973) (Knapp-USGS)
W74-09025

A STUDY OF THE RESERVOIR AT THE MATSUKAWA GEOTHERMAL FIELD,
Geological Survey of Japan, Kawasaki.
K. Baba, S. Takaki, G. Matsuo, and K. Katagiri.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1440-1447, 1973. 6 fig, 5 ref.

Descriptors: *Geothermal studies, *Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power, *Japan(Matsukawa).

The geothermal fluid reservoir of the Matsukawa geothermal field is below the Matsukawa andesite layer. Hot water and steam can be obtained from and below the lower part of dacite tuff layer, which lies beneath Matsukawa andesite. The lost circulation data during drilling often show the possible positions of a more permeable zone. Electric logging data give the clue to deduce whether the strata are permeable or not. Temperature logs obtained before discharging geothermal fluids often indicate the existence of a localized hot zone. In accordance with theory, some probable patterns of temperature and pressure near the well are shown, and their applications to the examples obtained at the wells of Matsukawa and its adjacent geothermal areas are discussed. (See also W74-08973) (Knapp-USGS)
W74-09026

ESTIMATION OF HYDROTHERMAL SYSTEMS BY MEANS OF WELL-HEAD OBSERVATIONS,
National Research Center for Disaster Prevention, Tokyo (Japan).
K. Yuhara.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics, 1970, Special Issue 2, Vol 2, Part 2, p 1458-1462, 1973. 4 fig, 2 tab, 8 ref.

Descriptors: *Geothermal studies, Hydrothermal studies, *Groundwater movement, Equations, Model studies, Thermal water, Drawdown, Water table, Boiling, Steam, Thermodynamics.
Identifiers: *Geothermal power.

Most geothermal steam originates from the underground boiling of groundwater. To find out the boiling conditions of thermal water in steam wells or reservoirs, a theoretical method is proposed. It can show the temperature, the pressure, the ascending velocity and the boiling depth of the thermal water in the well or the reservoir as functions of steam properties which can be observed at the wellhead. The knowledge gained by this method may be useful in estimating the hydrothermal system of the geothermal field. A few practical examples are given. (See also W74-08973) (Knapp-USGS)
W74-09028

FACTORS CONTROLLING BOREHOLE PERFORMANCE,
Department of Scientific and Industrial Research, Taupo (New Zealand).
For primary bibliographic entry see Field 2F.
W74-09034

CURRENT STATUS OF GEOTHERMAL POWER PLANTS AT THE GEYSERS, SONOMA COUNTY, CALIFORNIA,
Pacific Gas and Electric Co., San Francisco, Calif. Dept. of Engineering.
D. B. Barton.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1552-1559, 1973. 4 fig.

Descriptors: *Geothermal studies, *Thermal power, *California, Thermal powerplants, Hydrothermal studies, Steam.
Identifiers: *Geothermal power.

Electric power has been produced in commercial quantities from geothermal steam at The Geysers in Sonoma County, California, since 1960. Development at The Geysers started in 1922 when the first steam well was drilled. Eight wells were drilled from that date through 1925. However, commerical development was not feasible at that time. Some steam was used at an adjacent resort for heating and also, through use of two small reciprocating steam engine-generators, lighting was provided until 1959. Present development started with well drilling in 1955. As condensed water is contaminated, principally with ammonia, sulfides, and boron, its disposal presents a serious problem. Injection wells are currently being used for this purpose. The steam supply is slightly superheated and contains ammonia, carbon dioxide, and hydrogen sulfide as principal contaminants, amounting to 0.3% to 2.0% of the steam. (See also W74-08973) (Knapp-USGS)
W74-09035

PHYSICO-CHEMICAL SAMPLING OF HIGH TEMPERATURE WELLS IN CONNECTION WITH THEIR ENCRUSTATION BY CALCIUM CARBONATE,
Adademiya Nauk SSSR. Novosibirsk. Institut Neorganicheskoi Khimii.
P. A. Kryukov, and E. G. Larionov.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1624-1628, 1973. 9 fig, 2 tab, 6 ref.

Descriptors: *Hydrothermal studies, *Thermal power, *Water chemistry, *Scaling, Water wells, Well casings, Well screens, Corrosion, Sampling, Instrumentation, Water temperature.
Identifiers: *Geothermal power, *USSR.

The most important practical problems of physical-chemical studies of high-thermal underground waters are connected with the conditions of well encrustation due to calcium carbonate. Methods were developed for use in high-thermal waterfields

of Bolshebanny and Pauzhetsky in Kamchatka and Goryachy Plazh (Hot Beach) on Kunashir island, USSR. For water sampling of operating wells, a probe (a tube made of stainless steel) was used and inserted in the well through a gasket below the vaporization level. To measure pH in deep-seated water samples the probe was connected to a high-temperature cell with a glass and reference electrodes mounted in autoclave where natural pressure and temperature conditions were created. A thermistor was used for the continuous temperature measurement at different depths and for determining the position of vaporization zones in operating wells. (See also W74-08973) (Knapp-USGS)
W74-09036

GEOTHERMAL ENERGY RESOURCES FOR HEATING AND ASSOCIATED APPLICATIONS IN ROTORUA AND SURROUNDING AREAS,
Ministry of Works, Rotorua (New Zealand).
W. Burrows.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1662-1669, 1973. 6 fig, 1 tab.

Descriptors: *Geothermal studies, *Hot springs, Thermal water, Heated water, Heating, Water utilization, Water resources development.
Identifiers: *New Zealand.

Geothermal heat is available in Rotorua, New Zealand, for domestic, commercial, and potential industrial purposes. A map is given to assist in demonstrating the various heat zones and areas of productivity. An assessment is made of all areas indicating the proved potential and the possible development. (See also W74-08973) (Knapp-USGS)
W74-09042

SOME METHODS OF DEALING WITH LOW ENTHALPY WATER IN THE ROTORUA AREA OF NEW ZEALAND,
Cooke (W. L.) Ltd, Auckland (New Zealand).
W. L. Cooke.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue, 2, Vol 2, Part 2, p 1670-1675, 1973. 6 fig, 7 ref.

Descriptors: *Geothermal studies, *Hot springs, Thermal water, Heated water, Heating, Water utilization, Water resources development.
Identifiers: *New Zealand.

A review is presented of some changes and developments which have taken place in methods of controlling and using low enthalpy water in New Zealand. Laws which govern the utilization of underground hot waters, the techniques of construction, maintenance, and function of the wells, and of the plants for utilization and discharge are reviewed. Hot waters are used in houses, greenhouses, air conditioning, baths, and swimming pools. (See also W74-08973) (Knapp-USGS)
W74-09043

THE ECONOMICS OF THE SMALL GEOTHERMAL POWER STATION,
Department of Scientific and Industrial Research, Wairakei (New Zealand). Chemistry Div.
For primary bibliographic entry see Field 6C.
W74-09045

ECONOMICS OF THE GEYSERS GEOTHERMAL FIELD, CALIFORNIA,
Thermal Power Co., San Francisco, Calif.
For primary bibliographic entry see Field 6C.
W74-09046

ECONOMICS OF GEOTHERMAL ELECTRIC POWER GENERATION AT MATSUKAWA,
Japan Metals and Chemicals Co. Ltd., Tokyo. Exploitation Dept.
For primary bibliographic entry see Field 6C.
W74-09047

WAIRAKEI POWER STATION NEW ZEALAND--ECONOMIC FACTORS OF DEVELOPMENT AND OPERATION,
Ministry of Works, Wellington (New Zealand).
For primary bibliographic entry see Field 6C.
W74-09048

NEUTRON WELL LOGGING IN HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
F. L. Peterson.
Available from the National Technical Information Service as PB-233 124, $3.25 in paper copy, $1.45 in microfiche. Technical Report No 75, February 1974. 42 p, 15 fig, 4 tab, 9 ref. OWRR A-032-HI(2). 14-31-0001-3511.

Descriptors: *Hawaii, *Logging(Recording), Water wells, *Porosity, Gamma rays, Radiation, Basalts, Correlation analysis, Equipment, Aquifers, Water yield.
Identifiers: *Neutron well logging.

The primary objective was to apply neutron logging techniques to the problem of obtaining reliable porosity data and relating these to water yields from Hawaiian aquifers. Neutron well logging in Hawaiian basaltic formations has produced much important qualitative and quantitative information. The most important application has been the determination of porosity in the saturated zones. Interpretation of neutron log responses in Hawaiian basaltic formations is similar to conventional neutron log interpretation in sedimentary formations. Neutron count varies as an inverse function of porosity. High neutron counts are indicative of low porosities and low neutron counts are indicative of high porosities. In general, the neutron logs are extremely responsive to detailed changes in formation porosity, and of particular importance is that the reproducibility of neutron logs from the same well is excellent. Neutron logs from Hawaiian wells also are extremely responsive to the saturated-unsaturated boundary and to the casing termination. Surprisingly, the neutron logs show little consistent response to nominal hole diameter or borehole fluid salinity. Probably the best use of the neutron logs is in conjunction with other borehole geophysical logs. Correlation between neutron logs and electric resistivity logs is particularly good.
W74-09053

DESIGN AND OPERATION OF LAND TREATMENT SYSTEMS FOR MINIMUM CONTAMINATION OF GROUND WATER,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5D.
W74-09089

ARTIFICIAL RECHARGE--STATE OF THE ART,
Geological Survey, Lubbock, Tex.
R. F. Brown, and D. C. Signor.
Ground Water, Vol 12, No 3, p 152-160, May-June 1974. 48 ref.

Descriptors: *Artificial recharge, *Waste water disposal, Water storage, Hydrogeology, *Reviews, Research and development, Water quality control, Water management(Applied).

The largest potential underground reservoir for the storage of potable water is in the unsaturated zone. Artificial recharge has many similarities to liquid-waste disposal through deep wells. In both, the problem is to place liquid in a permeable lithologic unit at an economic rate, to predict movement and the chemical reactions and physical changes that take place while the liquid is in the reservoir. In both artificial recharge and liquid-waste storage, the nature of the storage must be known, particularly that of the unsaturated zone. Water commonly is recharged by surface spreading through basins or by induced recharge from adjacent streams and lakes or through injection wells. Research in recharge through basins has been dominated by mathematical models based on idealized conditions and empirical relations, derived by experimental sequencing of recharge operations, and operational controls in the pretreatment of recharge water. Recharge by injection wells has been undertaken in a variety of hydrologic environments. In Israel, efforts have been directed toward the analyses of diffusion and dispersion of the injected water. Much research in the United States has been directed toward the movement of bacteria and organic matter through an aquifer and toward the chemical modeling of changes in recharged water as it moves. (Knapp-USGS)
W74-09091

BORE HOLE SAMPLING OF SATURATED UNCEMENTED SANDS AND GRAVELS,
Commonwealth Scientific and Industrial Research Organization, Syndal (Australia). Div. of Applied Geomechanics.
C. M. Barton.
Ground Water, Vol 12, No 3, p 170-181, May-June 1974. 2 fig, 11 ref, append.

Descriptors: *Sampling, *Boreholes, Core drilling, Core logging, Sands, Gravels, Cores, Water wells, Equipment.
Identifiers: *Borehole sampling.

Borehole sampling of loose saturated sands and gravels forms a very important part of water well investigations. The materials are often difficult to sample and the adoption of adequate equipment and techniques can sorely tax the ingenuity of the driller. In some situations, the standard exploration sampling procedures can provide satisfactory information, while in others, it is necessary to resort to more precise techniques. A great variety of samplers have been designed including types such as open drive, piston drive, jet and extension flap samplers. No single sampler can cover the very wide range of material conditions and operational requirements which may be met during the drilling of water wells. In extreme circumstances, particularly for uncemented or poorly cemented gravels, it may be found necessary to stablize the strata prior to sampling. (Knapp-USGS)
W74-09094

A QUIET REVOLUTION: FLORIDA'S FUTURE ON TRIAL,
Florida State Senate, Tallahassee.
D. R. Graham.
The Florida Naturalist, Vol 45, No 5, p 146-151, 1972. 1 photo.

Descriptors: *Florida, *Water supply, *Land use, Watersheds(Basins), Legislation, Water resources development, Droughts, Non-structural alternatives, Zoning.

A counter-movement is underway among the states to recapture some of the land use powers which had previously been delegated to local government. Environmental crises have provided the catalyst for enactment of state land use legislation. In Florida, a crisis appeared in form of an immediate drought--and also uneasiness over current and projected population growth. During 1970 and 1971, the water supply for over two million residents reached dangerously marginal levels, and for the first time, the flood control districts pumped surface water into well fields. Thus, the

dwindling supply of water in canals and conservation areas was committed to avoid massive salt water intrusion in the water supply of Dade County. A special conference noted that in order to provide an adequate long-range water supply, the state must have a comprehensive land and water use plan. The conference also articulated the concern over population pressures and concluded that there is a limit to the number of people which the south Florida basin can support. Numerous pieces of legislation were enacted following the conference to provide a plan assessing the quality and quantity of natural resources, especially water. (Ritchie-Florida)
W74-09173

WATER-LEVEL CHANGES IN NORTHWESTERN KANSAS, 1950-73,
Geological Survey, Garden City, Kans.
M. E. Pabst, and E. D. Jenkins.
Kansas Geological Survey Journal, October 1973. 14 p, 1 fig, 2 tab, 13 ref.

Descriptors: *Water levels, *Groundwater, *Water wells, *Kansas, Withdrawal, Drawdown, Water yield, Irrigation water, Hydrologic data.

The water level in wells has declined as much as 36 feet since 1950 in parts of northwestern Kansas, primarily as a result of groundwater withdrawals for irrigation. During 1950-72, the number of irrigation wells increased from about 100 to 2,250, and annual withdrawals are estimated to have increased from 15,000 to 500,000 acre-feet. (Knapp-USGS)
W74-09194

PARTIAL AREA HYDROLOGY AND ITS APPLICATION TO WATER RESOURCES,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
For primary bibliographic entry see Field 2A.
W74-09200

IMPROVEMENT OF TROUT STREAMS IN WISCONSIN BY AUGMENTING LOW FLOWS WITH GROUND WATER,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 3B.
W74-09224

ANNUAL REPORT ON GROUND WATER IN ARIZONA, SPRING 1972 TO SPRING 1973.
Geological Survey, Phoenix, Ariz.
Arizona Water Commission Bulletin 7, April 1974. 46 p, 31 fig, 3 plates, 1 tab, 2 ref.

Descriptors: *Groundwater, *Arizona, *Water utilization, *Withdrawal, *Water levels, Drawdown, Water yield, Water resources development, Data collections, Hydrologic data.

Water levels in selected wells and annual groundwater pumpage in most of the developed areas in Arizona were determined. Maps show hydrologic conditions in Sacramento and Hualapai Valleys, potential well production by areas, depth to water in selected wells in spring 1973, and change in water levels in selected wells from 1968 to 1973. Nearly two-thirds of Arizona's water supply comes from the groundwater reservoirs. Although municipal and industrial uses are increasing, the greatest use is for irrigation of crops. For the 20th consecutive year, the withdrawal of groundwater exceeded 4 million acre-feet. In 1972 the withdrawal of groundwater was nearly 5 million acre-feet. (Knapp-USGS)
W74-09229

4C. Effects On Water Of Man'S Non-Water Activities

FORECASTING CHANGES IN WATER BALANCE UNDER INFLUENCE OF HUMAN ACTIVITY (PROGNOZIROVANIYE IZMENENIY VODNOGO BALANSA POD VLIYANIYEM KHOZYAYSTVENNOY DEYATEL'NOSTI),
For primary bibliographic entry see Field 4A.
W74-08709

PREDICTING THE HYDROLOGIC EFFECTS OF LAND MODIFICATIONS,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 4A.
W74-08753

ENVIRONMENTAL PROTECTION AND ENERGY CONSERVATION GO HAND-IN-HAND.
For primary bibliographic entry see Field 5B.
W74-08865

FOREST FIRES DAMAGE MORE THAN TREES,
American Forestry Association, Washington, D.C.
C. A. Connaughton.
American Forests, Vol 78, p 30-31, 60-62, August 1972. 2 photo.

Descriptors: *Burning, *Forest management, *Watershed management, *Forest fires, Infiltration, Flood protection, Flood damage, Carrying capacity, Erosion control, Recreation, Wildlife conservation, Public lands, Surface runoff, Channelization, Flood plain zoning, Watershed protection.
Identifiers: Controlled burning.

The protection of forest land from wildfires is necessary in order to provide protection from floods, which would invariably follow. It was watershed values in relation to fire, not forest production values, that triggered the designation of public lands as national forests. When a fire occurs on a steep mountain watersheds subject to torrential storms, devastating mudrock flows can be expected with major loss of property and even life, since the runoff is greatly accelerated and can carry large volumes of debris. With plant cover and normal soil infiltration rates, water of the best quality will be yielded. With plant cover destroyed by fire, debris laden streams may result with adverse influence on water supplies, fish spawning, reservoirs, and other hydraulic water quality features. After a watershed area is burned over, the problem arises as to what can be done to protect and rehabilitate the watershed. If flood damage is likely, land managers can immediately plan to restore the ground cover. This is usually done by seeding a quick growing plant. Sometimes preventative steps are undertaken such as debris racks, enlarged culverts, channel clear-out, and relocation of critically situated improvements. (Sperling-Florida)
W74-09126

EFFECT OF URBANIZATION ON RUNOFF FROM SMALL WATERSHEDS,
Arizona Univ., Tucson. Water Resources Research Center.
S. E. Kao, M. M. Fogel, and S. D. Resnick.
In: Hydrology and Water Resources in Arizona and the Southwest, Proc. of the 1973 meetings of the Arizona Section-American Water Resources Assn. and the Hydrology Section-Arizona Academy of Science, May 4-5, 1973. Tucson, Arizona, p 86-91 (1973). 5 fig, 3 tab, 8 ref. OWRR B-012-ARIZ(4) and B-023-ARIZ(3).

Descriptors: *Urbanization, *Watersheds(Basins), Runoff, *Urban runoff, *Rainfall-runoff relationships, Infiltration, Rainfall, Rainfall intensity, Peak discharge, Regression analysis.

Hydrologic data obtained from three urban and one rural experimental watersheds were analyzed to determine urbanization effects on runoff. A Soil Conservation Service procedure was used to explain the relationship between rainfall amounts and runoff. A runoff curve number obtained indicated that convective storm rainfall can be related to the runoff volume from small, semiarid watersheds. A linear relationship existed between runoff volume and its corresponding peak discharge rate. Urban watersheds with a high percentage of impervious areas may not necessarily produce high peak rates for a given volume of runoff. Results show that the SCS method of relating runoff volume to rainfall is sufficiently sensitive to determine the effect of urbanization on the volume of runoff. (Mastic-Arizona)
W74-09245

4D. Watershed Protection

EFFECT OF LONG-TERM MANAGEMENT ON PHYSICAL AND CHEMICAL PROPERTIES OF THE COSHOCTON WATERSHED SOILS,
Agricultural Research Service Coshocton, Ohio. North Appalachian Experimental Watershed.
W. M. Edwards, J. L. McGuiness, D. M. Van Doren, Jr., G. F. Hall, and G. E. Kelley.
Soil Science Society of America Proceedings, Vol 37, No 6, p 927-930, November-December, 1973. 5 tab, 22 ref.

Descriptors: *Water supply development, *Soil conservation, Water conservation, Runoff, Fertility, Erosion control, Water pollution sources, *Ohio, Watersheds(Basins), *Crop response.
Identifiers: *Coshocton watershed(Ohio).

After 30 years of differential treatment, 0.7- to 3.2-ha watersheds in improved management had higher crop yields and less runoff and erosion than watersheds under prevailing management. Soil samples were taken from the topsoils, plowsoles, and B horizons of the watersheds to determine the effect of such management on soil physical and chemical characteristics. Large changes in chemical characteristics resulted from the higher fertilization associated with improved management but the changes generally did not persist below the topsoil layer. Measurable differences in physical characteristics of the watershed soils were slight and were confined to the topsoil layer. Differences in crop yield and hydrologic performance are attributed to fertilization, crop growth, and tillage differences associated with the two levels of management. (Skogerboe-Colorado State)
W74-08813

CONSERVATION AND LAND DEVELOPMENT.
For primary bibliographic entry see Field 6E.
W74-09153

COUNTY SEDIMENT CONTROL PROGRAMS.
For primary bibliographic entry see Field 6E.
W74-09157

5. WATER QUALITY MANAGEMENT AND PROTECTION

METHOD OF PURIFYING WATER,
S. R. Kennedy.
U.S. Patent No. 3,801,501, 3 p, 2 ref; Official Gazette of the United States Patent Office, Vol 921, No 1, p 305, April 2, 1974.

Descriptors: *Patents, *Waste water treatment, *Chemical reactions, *Neutralization, *Water purification, *Water supply, pH, Iron, Ammonia, Flocculation, Chlorination, Potable water, Water reuse.
Identifiers: *Chemical treatment, Sulfuric acid.

Polluted water is first mechanically treated to clarify it and remove most of the suspended or retained solids. The treated water is mixed with sulfuric acid to decrease the pH to 2.5 and the acidified water is maintained at this pH for at least 3 1/2 minutes. The effluent from this step is monitored so that the pH can be maintained at the desired point. Maintenance of the desired pH is accomplished by introducing a further amount of sulfuric acid during the period before the next step if the pH begins to rise above the selected pH. The acid-containing water is then brought in contact with a source of iron such as iron bars, iron plates, or scrap iron in sufficient quantity to have 3.2 square feet of surface of the iron exposed to the acid liquid for every gallon per minute flow. The reaction with the iron takes place during the retention time of 6 minutes in the iron treatment tank. The pH rises to about 3.5. After the iron treatment the water is neutralized utilizing ammonia. The water is thoroughly mixed with the ammonia so that the neutralizing is effective throughout and the water is brought to a pH of at least 7. In lieu of ammonia, sodium hydroxide, barium hydroxide or potassium hydroxide may be substituted. The iron salt in the water acts as a flocculating agent but other flocculating agents such as aluminum sulfate may be added. The water may also be subsequently treated with chlorine and also mechanically degasified to improve the quality of the effluent. (Sinha-OEIS)
W74-09186

5A. Identification Of Pollutants

USE OF DAPHNIA MAGNA FOR THE MICROBIO-ASSAY OF PESTICIDES, I. DEVELOPMENT OF STANDARDIZED TECHNIQUES FOR REARING DAPHNIA AND PREPARATION OF DOSAGE MORTALITY CURVES FOR PESTICIDES,
D. E. H. Frear, and J. E. Boyd.
Journal of Economic Entomology, Vol 60, p 1228-1239, 1967.

Descriptors: *Bioassay, *Daphnia, Testing procedure, Pesticides, Pollutant identification, *Pesticide residues, Toxicity, Insecticides, Mortality, Water pollution effects.

It is possible to rear Daphnia magna under closely-controlled laboratory conditions, when asexual reproduction yields a homogeneous population suitable for microbio-assay of pesticide residues. Tests with various insecticides showed that some were toxic even in very low trace concentrations. Detailed procedure is given for rearing daphnids and using them for bio-assays, and dose-mortality curves and LD50 values are given for 56 common pesticides. (See also W74-08715)
W74-08714

USE OF DAPHNIA MAGNA FOR THE MICROBIO-ASSAY OF PESTICIDES. II. COMPARISON OF MICROBIO-ASSAY WITH GAS CHROMATOGRAPHY FOR ANALYSIS OF PESTICIDE RESIDUES IN PLANT EXTRACTS,
D. E. H. Frear, and N. S. Kawar.
Journal of Economic Entomology, Vol 60, p 1228-1239, 1967.

Descriptors: *Bioassay, Daphnia, Testing, Pesticide residues, Gas chromatography, Toxicity, Pollutant identification, Toxicity, Insecticides, Mortality, DDT, Water pollution effects.
Identifiers: Ethion, Lindane.

The Daphnia bio-assay method was compared with gas chromatography for determining traces of pesticides (DDT, ethion, and lindane), and gas chromatography gave more accurate and more consistent results. (See also W74-08714)
W74-08715

AN INVESTIGATION OF THE COULTER COUNTER IN 'BIOMASS' DETERMINATIONS OF NATURAL FRESHWATER PHYTOPLANKTON POPULATIONS,
Royal Holloway Coll., Englefield Green (England).
J. H. Evans, and S. M. McGill.
Hydrobiologia, Vol 35, No 3/4, p 401-419, 1970 (Illus).

Descriptors: *Algae, *Growth rates, *Phytoplankton, *Biomass, Water pollution effects, Pollutant identification.
Identifiers: Coulter counter.

During the period Nov. 1965 to Nov. 1968 an investigation was made into the use of the Model A Industrial Coulter Counter for determining the biomass of freshwater phytoplantkon. Parallel determinations of other parameters, including algal numbers, calculated algal volumes, dry weight, C content and chlorophyll pointed towards the general validity of the results obtained by the electronic method provided the background level of non-algal detritus is relatively low. The importance of parallel determinations, especially those involving visual inspection of samples, is emphasized. For uni-algal samples, either from culture or nature, or for natural samples dominated by 1 sp., the Coulter Counter does not necessarily give a quicker result than traditional methods of analysis. However, for at least 2 reasons the Coulter Counter adds a most useful new dimension to the realm of phytoplankton analysis. For assemblages of algae, whether or not certain species are dominant or co-dominant, a more rapid determination of a result, which can be taken to represent the biomass, is possible than by other methods. Such results, expressed here as total particulate volume (T.P.V.), can be accepted as being as accurate as those obtained by any other method and are probably better than some. In addition to the single figure T.P.V. result for a sample, volume analyses within selected size and particle number ranges can be made.
W74-08727

HEAVY METAL CONCENTRATIONS IN MUSEUM FISH SPECIMENS: EFFECTS OF PRESERVATIVES AND TIME,
Smithsonian Institution, Washington, D.C. Dept. of Vertebrate Zoology.
R. H. Gibbs, Jr., E. Jarosewich, and H. L. Windom.
Science, Vol 184, No 4135, p 475-477, April 26, 1974. 2 fig, 5 ref.

Descriptors: *Cadmium, *Copper, *Zinc, Mercury, *Lead, Fish physiology, Time, *Heavy metals, *Pollutant identification.
Identifiers: Metals concentration, *Preservatives effects.

Higher concentrations of cadmium, copper, zinc, and sometimes lead, and lower concentrations of mercury and sometimes lead were found in specimens of myctophid fish preserved for one month in formalin, ethyl alcohol, and isopropyl alcohol as compared with unpreserved frozen specimens. Properties of the preservatives and species differences in fish tissues both influence these metal concentrations. Until the changes resulting from preservation are understood, comparisons of concentrations of metals between museum specimens and unpreserved or frozen specimens must be considered unreliable. (Sandoski-FIRL)
W74-08792

DESIGN OF COST-EFFECTIVE WATER QUALITY SURVEILLANCE SYSTEMS,
Raytheon Co., Portsmouth, R.I. Oceanographic and Environmental Services.
V. Beckers, and G. Chamberlain.
Copy Available from GPO Sup Coc as EP1.23:600/5-74-004, $4.05; microfiche from NTIS as PB-232 979 $1.45. Environmental Protection Agency, Socioeconomic Studies Series Report EPA-600/5-74-004, January 1974. 413 p, 91 fig, 34 tab, 31 ref. EPA Program Element 1BA030, 68-01-0703.

Descriptors: *Network Design, *Monitoring, *Mathematical Models, *Systems Analysis, *Data Collection, Reliability, Maintenance, Costs, Water Quality, Pollution Abatement, *Ohio, *Pennsylvania, Water Pollution, Measurement, Water Quality Control, Water Quality Act.
Identifiers: *Beaver River Basin(Ohio-Penn), *Cost Effectiveness, Surveillance, Ohio River Basin.

This report presents the development and sucessful demonstration of quantitative methods for the design of river basin water quality surveilance systems for pollution abatement. The methods provide a systematic approach to the consideration of expected stream conditions, system characteristics, equipment performance, and cost in the selection of a preferred system design from among a number of candidates. In the systems approach, the total system is evaluated for cost and effectiveness. Mathematics previously developed to describe the effectiveness of sampling is used. The analysis of performance draws heavily on reliability and maintainability technology. Data availability remains a constraint to the general application of the methods. The methods are computerized and the computer programs are detailed. They make use of the information available from the computerized river basin models now under general development. They are demonstrated to function satisfactorily on the Beaver River Basin when artificial data are used to supplement the data base. It is concluded that the methods are acceptable for use by governmental water quality agencies under the existing constraints. (EPA)
W74-08825

INVESTIGATION OF SURFACE FILMS - CHESAPEAKE BAY ENTRANCE,
Virginia Inst. of Marine Science, Gloucester Point.
W. G. MacIntyre, C. L. Smith, J. C. Mundy, V. M. Gibson, and J. L. Lake.
Copy Available froT GPO Sup Doc as EP1.23:670/2-73-099, $2.05; microfiche from NTIS as PB-232 968, $1.45. Environmental Protection Agency Technology Series Report EPA 670/2-73-099, February 1974. 168 p, 32 fig, 22 tab, 105 ref. EPA Project 15080 EJ0.

Descriptors: *Oil spills, *Estuarine environment, *Chesapeake Bay, Oil Pollution, Estuaries, Currents, Sampling, Chemical Analysis, Chromatography, Chlorinated Hydrocarbons, Pesticides, Liquids, *Path of pollutants.
Identifiers: *Surface films, *Oil slicks, Remote sensing, Hydrocarbon analysis, Oil aging, Fatty acids.

Experimental point source oil releases have been conducted in the Chesapeake Bay mouth area. Predictions of oil slick motion were tested, and slicks were sampled and analyzed to measure their aging rates over periods up to 32 hours. Remote sensing techniques were used to detect and measure the spreading rate of oil. Some laboratory oil film experiments were done to further document and elucidate aging processes. Results indicate a reasonable motion prediction, an explanation of the non-biological initial aging of oil films, and a fair corroboration of a theoretical oil spreading model. Indigenous surface films in the study area were analyzed for lipid and chlorinated hydrocarbon content. Hydrocarbons were 300-500 microgram per liter and fatty acids and ester 700-7800

microgram per liter in surface film samples. Chlorinated hydrocarbons were generally less than 100 parts per trillion in surface films, in contrast to some earlier high concentrations found in Biscayne Bay. Surface film analysis limitations imposed by sampling methods are discussed. Plankton in slick, non-slick, and subsurface water were counted. Populations were higher in surface than subsurface water, and higher in non-slick than in slicked surface water. (EPA)
W74-08831

STREAM STANDARDS: DEAD OR HIDING,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
For primary bibliographic entry see Field 5G.
W74-08866

DETERMINING THE BIODEGRADABILITY OF ORGANIC COMPOUNDS.
For primary bibliographic entry see Field 5B.
W74-08867

ENVIRONMENTAL RADIATION DOSE CRITERIA AND ASSESSMENT-PATHWAY MODELING AND SURVEILLANCE,
Brookhaven National Lab., Upton, N.Y. Health Physics and Safety Div.
For primary bibliographic entry see Field 5B.
W74-08875

INSTRUMENTATION AND ENVIRONMENTAL RADIATION ASSESSMENT SYSTEMS,
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-08876

RADIOLOGICAL ENVIRONMENTAL MONITORING--THE EPA APPROACH,
Office of Radiation Programs, Washington, D.C.
W. D. Rowe.
IEEE Transactions on Nuclear Science, Vol NS-21, No 1, p 416-422, February, 1974. 6 fig, 3 tab, 9 ref.

Descriptors: *Monitoring, *Radiation, Model studies, Instrumentation, Local governments, Costs.
Identifiers: Environmental radiation doses.

The approach of the Environmental Protection Agency to monitoring is discussed, with emphasis on dose computation utilizing source data, environmental models, and minimal monitoring for validation. This approach, which requires extensive use of models to predict dose and minimal environmental measurements, is expected to be more cost effective than the conventional approach. The need for monitoring at the state and/or local level is primarily to enforce standards and to obtain timely and effective data upon which emergency response decisions can be based. The EPA approach to radiological environmental monitoring will require the development and use of instrumentation which provides the data to implement this approach in the most cost effective manner. (Merritt-FIRL)
W74-08877

THE NEED FOR AN INDICATOR VIRUS IN WATER QUALITY TESTING,
Water Pollution Control Federation, Washington, D.C. Technical Services.
E. DeMichele, G. W. Burke, Jr., and M. S. Shane.
Water and Sewage Works, Vol 121, No 4, p 39, April, 1974.

Descriptors: *Water quality, *Viruses, *Bioindicators, Water analysis, Water pollution, Testing, Public health.

Water quality problems are discussed and the need for an indicator virus in water quality testing is proposed. The validity of the coliform test as an indicator of potential pathogenic microbial water pollution is being increasingly questioned. The fact that laboratory studies have shown enteroviruses to be more resistant to normal water and waste water chlorination practices than organisms of the coliform group lends justification to the hypothesis that coliform counts may not adequately monitor viral infection of water. The main problem is knowing the viruses exist, but being unable to measure them accurately or knowing which, if any, might cause infection. A test procedure for an indicator virus is proposed to be developed in a manner paralleling the use of E. coli as an indicator bacterium. The procedure should provide a rational means of measuring treatment efficiency in terms of human health and well being. It is not necessary that the virus be pathogenic, but rather, it should be similar to infectious viruses in terms of make up, tolerance, and stability. (Merritt-FIRL)
W74-08880

DETECTION SYSTEMS FOR THE LOW LEVEL RADIOCHEMICAL ANALYSIS OF IODINE-131, IODINE-129 AND NATURAL IODINE IN ENVIRONMENTAL SAMPLES,
Battelle-Pacific Northwest Labs., Richland, Wash.
F. P. Brauer, and J. H. Kaye.
IEEE Transactions on Nuclear Science, Vol NS-21, No 1, p 496-502, February, 1974. 10 fig, 1 tab, 25 ref.

Descriptors: *Iodine radioisotopes, *Neutron activation analysis, *Separation techniques, *Oxidation, Gamma rays, Spectrometers, Measurement, *Pollutant identification.

A procedure based on chemical separation techniques and activation analysis has been developed for the sequential analysis of low levels of I131, I129, and natural iodine in environmental samples. The iodine is first separated from the samples by oxidation. The separated iodine is then counted by low level, beta-gated gamma-ray spectrometry for the measurement of I131. The chemical yield for the separation is measured by means of I125 tracer. Activation analysis is used for measurement of the separated natural iodine, I127 and I129. The natural iodine is estimated from either the I126 or I128 activity produced in the sample. The induced I130 is used to estimate the I129 concentration. Measurements have been made of iodine radioactivity in the environment at concentrations below the limits established for radiation protection purposes. (Merritt-FIRL)
W74-08885

GE(LI) LOW LEVEL IN SITU GAMMA-RAY SPECTROMETER APPLICATIONS,
California Univ., Livermore. Lawrence Livermore Lab.
P. L. Phelps, L. R. Anspaugh, S. J. Roth, G. W. Huckabay, and D. L. Sawyer.
IEEE Transactions on Nuclear Science, Vol NS-21 No 1, p 543-552, February 1974. 8 fig, 4 fig, 10 ref.

Descriptors: *Spectrometers, *Radioisotopes, *Soils, Measurements, Methodology, Liquid wastes, Gases, Effluents, Analytical techniques, *Pollutant identification, *Nevada.
Identifiers: *Ge(Li) spectrometer.

The application of a Ge(Li) spectrometer for in-situ measurements of radionuclides contained in soil is described. This is being done at nuclear reactor sites and in complex radionuclide fields at the Nevada Test Site. The methodology and precision of the in-site spectrometer technique has previously been established for analysis of radionuclides in soil. Application of the technique to gaseous and liquid effluents containing radionuclides has shown a great deal of promise. (Merritt-FIRL)
W74-08886

COMPARISON OF GE(LI) AND ANTICOMPTOM SYSTEMS FOR MEASUREMENTS OF ENVIRONMENTAL SAMPLES,
Battelle-Pacific Northwest Labs., Richland, Wash.
N. A. Wogman.
IEEE Transactions on Nuclear Science, Vol NS-21, No 1, p 526-535, February, 1974. 17 fig, 2 tab, 21 ref.

Descriptors: *Spectrometers, *Gamma rays, *Radioisotopes, Measurements, Equipment, Evaluations, *Pollutant identification.
Identifiers: *Ge(Li) spectrometers, NaI(T1) spectrometers.

A variety of sensitive low level counting systems are discussed from an analyst's viewpoint, centering on a variety of NaI(T1) and Ge(Li) gamma ray spectrometers. The coincident gamma ray emitters are most sensitively detected through NaI(T1) multi-dimensional gamma ray spectrometry, while single gamma ray emitters are very sensitively detected with Ge(Li) detector systems. NaI(T1) detector systems are superior in general for environmental measurements. (Merritt-FIRL)
W74-08887

A GAMMA-RAY SPECTRUM ANALYSIS TECHNIQUE FOR LOW-LEVEL ENVIRONMENTAL RADIONUCLIDES,
Emory Univ., Atlanta, Ga. Dept. of Physics.
R. E. Wood, and J. M. Palms.
IEEE Transactions on Nuclear Science, Vol NS-21, No 1, p 536-542, February, 1974. 5 fig, 1 tab, 4[illegible] ref.

Descriptors: *Spectrometers, *Gamma rays, *Analytical techniques, Measurements, *Radioisotopes, Reviews, Equipment, *Pollutant identification.
Identifiers: *Ge(Li) spectrometer.

The requirements for gamma-ray spectra analysis for low level environmental radionuclides are reviewed. Special emphasis is placed on the routine and rapid analysis of large numbers of samples. Pertinent requirements for analysis include the system energy and efficiency calibration, the library of gamma rays of concern, criteria of establishing the limits of sensitivity, and techniques used for gamma ray intensity and background determinations. An analysis code (CETUS) used with a Ge(Li) detector and multichannel analyzer interfaced to a programmable desk top calculator is described. (Merritt-FIRL)
W74-08888

METHOD AND APPARATUS FOR DETERMINING POLLUTION INDEX,
Environmental Devices Corp., Marion, Mass (assignee)
E. C. Brainard, II.
U.S. Patent 3,807,860. Official Gazette of the U.S Patent Office, Vol 921, No 5, p 1986, April 30 1974. 1 fig.

Descriptors: *Patents, Water pollution Methodology, Equipment, Saline water, *Salinity *Refractivity, *Pollutant identification *Electrical conductivity.
Identifiers: *Pollution index.

A method and apparatus for providing an index of the concentration of pollutant in water is described. The index is determined according to the difference between two different measures of the salinity of water. In a preferred embodiment the two measures of salinity are measures of electrical conductivity and of refractive index. (Merritt-FIRL)
W74-08903

SEDIMENTARY FLUORITE IN TAMPA BAY, FLORIDA,
University of South Florida, Tampa, Fla. Dept. of Geology.
W. H. Taft, and D. F. Martin.
Environmental Letters, Vol 6, No 3, p 167-174, 1974. 4 ref.

Descriptors: *Water sampling, *Sampling, *Sediments, Analytical techniques, Estuaries, *Fluoride, Sea water, Temperature, Hydrogen ion concentration, *Florida.
Identifiers: *Tampa Bay(Fla), *Fluorite.

Water and sediment samples were collected at eight sites in Tampa Bay adjacent to the southernmost discharge canal of an industrial company, Gardinier, Incorporated. Water samples were frozen within 4 hours of collection and sediment samples were dried and prepared for x-ray diffraction. The results show: the existence of sedimentary fluorite; remarkably low pH meter readings which indicate the buffering capacity of 12 acre meters of estuarine water was virtually exhausted; the fluoride concentration is as much as 40 times its concentration in normal sea water, undoubtedly because of the complexing by hydrogen ions and silicon; and the temperature differentials in such relative shallow water are not only significant, but are the inverse of what would normally be expected. (Merritt-FIRL)
W74-08907

AN AIRBORNE GAMMA RAY SPECTROMETER AND ITS APPLICATION IN NUCLEAR POWER PLANT SITE SURVEYS,
Rice Univ., Houston, Tex.
G. E. Fryer, and J. A. S. Adams.
IEEE Transactions on Nuclear Science, Vol NS-21, No 1, p 572-584, February, 1974. 8 fig, 4 tab, 15 ref.

Descriptors: *Nuclear powerplants, *Gamma rays, *Spectrometers, *Remote sensing, Monitoring, Air pollution, Radioactivity, Measurements, *Texas, Instrumentation, Surveys, Flooding.
Identifiers: Thermoluminescence dosimeters, Helicopters.

Airborne radiometric surveys from low flying helicopters have been completed for three nuclear power plant sites in Texas. The gamma ray counting data acquired in the air are converted to ground dose rate and plotted as a series of profiles. A radial flight line pattern provides easy position control and concentrates sampling density over the plant site. The 5-8 fold range of natural and man made radiation background within 10 miles of the three plant sites is statistically well characterized by over 14,000 spectra taken directly from 3.8% of each 314 sq mi survey area. The aerial dose estimates agree closely with thermoluminescence dosimeter data taken on the ground over 3 mo periods. The instrumentation system, survey rationales, data reduction, and analysis procedures are described. One of the major complications of the area is the periodic and extensive flooding of the rice fields, attenuating the gamma ray flux from the ground. (Merritt-FIRL)
W74-08908

ENVIRONMENTAL DOSE MEASUREMENTS IN THE VICINITY OF NUCLEAR FACILITIES,
duPont de Nemours (E.I.) and Co., Aiken, S.C. Savannah River Plant.
R. M. Hall, Jr., and D. I. Ross.
IEEE Transactions on Nuclear Science, Vol NS-21, No 1, p 451-455, February, 1974. 6 fig, 1 tab, 6 ref.

Descriptors: *Monitoring, *Nuclear powerplants, *Radiation, Measurements, Radioactivity, Instrumentation, Filters, *South Carolina.
Identifiers: *Savannah River Plant(So.Car.), *Dosimeters, Dosimetry systems.

The environmental radiation monitoring program for the Savannah River plant was recently altered to make more detailed readings at more locations in the plant's environs. Monitoring stations were increased from 40 to about 500. Additional stations were selected to improve the delineation and measurement of natural radiation. Monitoring stations near each operating area were supplemented by additional stations near effluent streams and at one mile intervals along the plant perimeter. Thirty fire towers within a 50 mile radious of the plant are used to place monitors up to 80 ft above the ground to aid in distinguishing between airborne and terrestrial radioactivity. Most measurements are taken quarterly, but several locations are measured biweekly to detect short term variations. (Merritt-FIRL)
W74-08911

FLUID SAMPLE ANALYSIS SYSTEM,
Durrum Development Corp., Palo Alto, Calif. (assignee)
For primary bibliographic entry see Field 7B.
W74-08914

INVESTIGATION OF THE CHEMICAL IDENTITY OF SOLUBLE ORGANOPHOSPHORUS COMPOUNDS FOUND IN NATURAL WATERS,
Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
R. A. Minear, and K. A. Walanski.
Available from the National Technical Information Service as PB-232 972; $3.75 in paper copy, $1.45 in microfiche. Illinois Water Resources Center, Urbana, Research Report No 86, May 1974. 71 p, 25 fig, 12 tab, 53 ref, OWRR A-060-ILL(1). 14-31-0001-3813.

Descriptors: *Pollutant identification, Cultures, Algae, *Phosphorus compounds, *Organophosphorus compounds, Chemical analysis, Water analysis, Aqueous solution.
Identifiers: Organic phosphorus, Algal soluble organics, *Inositol phosphates, Sephadex, Gel filtration.

The ability of various laboratory algal cultures to generate substantial quantities of dissolved organic phosphorus (DOP) compounds has been demonstrated. After isolation and concentration of these compounds by low pressure filtration, freeze drying and redissolution, molecular size profiles on Sephadex gels were obtained. Comparison between DOP and inositol phosphate profiles on Sephadex G-25 prompted specific studies for the presence of inositol phosphates in the culture solutions. Alkaline bromination techniques established in soil chemistry research were employed in conjunction with Sephadex gel filtration to generate cicumstantial evidence for the presence of inositol monophosphate and the absence of inositol hexaphosphate. The results obtained in conjunction with preliminary volatile derivative studies have provided the base for continued studies on the specific chemical nature of DOP compounds in aqueous systems.
W74-08935

RELATIONSHIP BETWEEN BOD REMOVAL AND LAS DETERGENT REMOVAL IN WASTEWATER TREATMENT SYSTEMS,
Puerto Rico Univ., Mayaquez. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-08939

SPECIFIC ION MASS SPECTROMETRIC DETECTION FOR GAS CHROMATOGRAPHIC PESTICIDE ANALYSIS,
Battelle Columbus Labs., Ohio.
M. B. Neher, and J. R. Hoyland.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-004, $1.55; microfiche from NTIS as PB-233 136. Environmental Protection Agency, Technology Series Report EPA-660/2-74-004, January 1974. 33 p, 15 fig, 7 ref, 2 append. EPA Project 16ADN28. Grant R-800909.

Descriptors: *Mass spectrometry, *Gas chromatography, *Pollutant identification, Organic compounds, *Computer programs, Data processing, *Organic pesticides, Monitoring, *Pesticides.
Identifiers: *Specific ion monitoring, Computer control, Pesticide mixture.

Computer programs have been developed for a PDP8/e controlling a Finnigan 1015 quadrupole mass spectrometer to monitor selected ions from components in a gas chromatographic effluent. The program is designed to monitor only a few ions (1 to 8 to enhance the sensitivity for the selected ions. Signal-to-noise levels of 10:1-30:1 have been obtained for 0.2 ng or less of four pesticides employing chemical ionization mass spectrometry and a digital smoothing routine. (EPA)
W74-08943

HEALTH AND SAFETY LABORATORY FALLOUT PROGRAM -- QUARTERLY SUMMARY REPORT -- DECEMBER 1, 1973 THROUGH MARCH 1, 1974,
Health and Safety Lab. (AEC), New York.
For primary bibliographic entry see Field 5B.
W74-08954

RADIOACTIVITY DISTRIBUTION IN THE STRATOSPHERE FROM CHINESE AND FRENCH HIGH YIELD NUCLEAR TESTS (1967-1970),
National Oceanic and Atmospheric Administration, Silver Springs, Md. Air Resources Labs.
For primary bibliographic entry see Field 5B.
W74-08955

HEALTH AND SAFETY LABORATORY FALLOUT PROGRAM -- QUARTERLY SUMMARY REPORT -- DECEMBER 1, 1973 THROUGH MARCH 1, 1974, (APPENDIX),
Health and Safety Lab. (AEC), New York.
E. P. Hardy, Jr.
Available: NTIS, Springfield, Va., as Report No. HASL-281 (Appendix); $10.60 per copy, $1.45 microfiche. Report No. HASL-281, Appendix, April 1974, 459 p, 6 ref.

Descriptors: *Data collections, *Fallout, *Strontium, *Cesium, *Sampling, *Sites, *Radioisotopes, Lead, Air pollution, Water pollution, Water pollution sources, Nuclear explosions, Milk, Potable water, Food chain, Public health.
Identifiers: Deposition(Radioactive particles), Concentration.

Reports fallout deposition data of strontium and cesium from sampling sites around the world, radionuclides and lead in surface air, and radiostrontium in milk and tap water. Tables of conversion factors and radionuclides of interest in the HASL fallout program are given. (See also W74-08954) (Houser-ORNL)
W74-08956

NUCLEAR REACTIVITY EVALUATIONS OF 216-Z-9 ENCLOSED TRENCH,
Atlantic Richfield Hanford Co., Richland, Wash. Research Dept.
Available from NTIS, Springfield, Va, as Report No ARH-2915. Report No ARH-2915, December 1973. 263 p, A. E. Smith, Compiler, 60 fig, 28 tab, 17 ref.

Descriptors: *Plutonium, Survey, Measurement, Assay, *Radioactivity, *Trenches, *Washington, Water pollution, Groundwater, Water table, Sites, Radioactive waste disposal, *Remote sensing, Geology, Soils, Sampling, Model studies, Mathematical models, Chemical analysis.
Identifiers: *Richland(Wash).

Plutonium accumulation and the nuclear criticality implications were evaluated for a subsurface liquid waste disposal site at Hanford, Washington. Remote plutonium detection by infrared, gamma, and neutron surveys are described. Geological drilling and soil sampling techniques were developed and described. Nuclear criticality safety was evaluated by computer model calculations and by neutron pulsing techniques. Technologies used to evaluate a waste disposal site for a plutonium recovery operation are discussed. (Houser-ORNL)
W74-08966

VASCULAR PLANTS OF WASTE STORAGE SITES IN THE 200 AREAS OF THE HANFORD RESERVATION,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 2I.
W74-08967

SEPARATION AND ANALYSIS OF NATURAL WATER.
Davidson Coll., Biology Div.
Available from NTIS, Springfield, Va, as Rept No K-L-6119; $4.00/copy, $1.45/microfiche. Report No K-L-6119, September 1966. 23 p, 5 fig, 5 ref. (Also presented at the Symposium on the Capacity of Streams to Assimilate Wastes, 152nd Annual Meeting of the America Chemical Society, New York, September 1966.

Descriptors: *Natural streams, Freshwater, Water pollution, Water pollution treatment, Water quality control, *Radioactive wastes, Nuclear wastes, Centrifugation, Coagulation, Water purification, Limnology, Biology, Sediment load, *Pollutant identification, *Separation techniques.

Qualitative and quantitative fractionation of the various organic and inorganic species of particles occuring in natural water is a prerequisite to investigations of cycling of biologically or surface active contaminants in the aquatic biosphere. With the increasing release of these contaminants coinciding with increasing reuse of water, interest is developing in means of assessing the possible biohazard the contaminants may present. The suspended and colloidal sized organic particles typically found in natural water are emphasized, although the same theories and general methods apply to similar particles in other fluids and to inorganic particles. Generally, centrifugal methods are not practical for particles with a molecular weight of less than 10 to the sixth power and a sedimentation rate of less than 10S when dealing with large volumes of fluid. (Houser-ORNL)
W74-08969

RADIOLOGICAL SURVEILLANCE AROUND TURKEY POINT, 1970-1971,
Florida State Div. of Health, Jacksonville. Radiological and Occupational Health Section.
W. Johnson, and J. Eakins.
Radiation Data and Report, Vol 15, No 3, p 105-115, March 1974. 2 fig, 23 tab, 3 ref.

Descriptors: *Monitoring, *Nuclear powerplants, *Background radiation, Radioactivity, Environment, Air, Water, Local precipitation, Soil analysis, Soil contamination, Water pollution, Ocean water, Fresh water, Vegetation, Aquatic animals, Aquatic plants, Ecology, Algae, Crustaceans, Grasses, Fish, Food chains, *Florida.
Identifiers: *Surveillance program, Preoperational, *Turkey Point(Fla).

Prior to the operation of the Turkey Point Nuclear Power reactor, environmental media were sampled and data are presented for 1970-1971. Basic media investigated include air, precipitation, soil, silt, and water, including sea water. A number of media utilized as indicator organisms serve to investigate the behavior of radionuclides in several ecological levels. Indicators are mangrove vegetation, fresh water algae, turtle grass and sponges. Additional items found in the human food chain that were analyzed include crustacea, fish, and food crops. Data on the analysis of the various samples are given. (Houser-ORNL)
W74-08970

PREOPERATIONAL LEVELS OF ENVIRONMENTAL RADIOACTIVITY IN WATER AND SEDIMENT AROUND TURKEY POINT NUCLEAR POWER PLANTS, CARD SOUNDS, FLORIDA,
Florida Univ., Miami. School of Medicine.
T. S. Johnson, and T. D. Pemble.
Radiation Data and Reports, Vol 15, No 3, p 117-123, March 1974. 2 fig, 3 tab, 6 ref.

Descriptors: *Monitoring, Analytical techniques, *Sampling, Instrumentation, Calibrations, Standards, Measurement, *Radioisotopes, Radioactivity, Nuclear powerplants, Water pollution, Soil contamination, Silts, Sediments, *Data collections, Sounds, *Florida, *Baseline studies.
Identifiers: *Card Sound(Fla), Preoperational studies.

An investigation of the levels and distribution of gross alpha, gross beta and selected gamm-emitting radioisotopes present in water and sediment samples from Card Sound, Florida, was performed. This environmental radioactivity baseline study was carried out between January 1971 and June 1972, prior to operation of the Turkey Point Nuclear Power Plants and discharge of liquid effluents from these plants into Card Sound. Sample collection and analysis for the various radionuclides found are described. (Houser-ORNL)
W74-08971

RADIATION DATA -- SECTION II, WATER.
Environmental Protection Agency, Washington, D.C.
Radiation Data and Reports, Vol 15, No 3, p 129, March 1974. 1 fig, 2 tab, 4 ref.

Descriptors: *Monitoring, *Sampling, *Analytical techniques, *Assay, *Radioactivity, *Water pollution, Ground water, Water pollution treatment, Water quality, Surface water, Water quality standards, Domestic water, Potable water.
Identifiers: *Surveillance program, Gross beta, Gross alpha.

Information is provided by Federal, State, and foreign governmental agencies and other cooperating organizations. Data reported are accumulated from surveillance programs concerning radionuclide concentrations of surface, ground, and treated water. Most of the analytical determinations are for gross beta and gross alpha radioactivity. These values are compared with the Public Health Service Drinking Water Standards. (Houser-ORNL)
W74-08972

ENVIRONMENTAL RADIOACTIVITY IN THE FAROES IN 1972,
Danish Atomic Energy Commission, Risoe. Research Establishment.
For primary bibliographic entry see Field 5B.
W74-09086

ENVIRONMENTAL RADIOACTIVITY IN DENMARK IN 1972,
Danish Atomic Energy Commission, Risoe. Research Establishment.
For primary bibliographic entry see Field 5B.
W74-09087

ENVIRONMENTAL RADIOACTIVITY IN GREENLAND IN 1972,
Danish Atomic Energy Commission, Risoe. Research Establishment.
For primary bibliographic entry see Field 5B.
W74-09088

WATER RESOURCES DATA FOR GEORGIA, 1973.
Geological Survey, Doraville, Ga.
For primary bibliographic entry see Field 7C.
W74-09116

MONITORING FOR TRACE METALS--WATER ENVIRONMENT,
National Environmental Research Center, Cincinnati, Ohio.
D. G. Ballinger.
In: Cycling and Control of Metals; Proceedings of Environmental Resources Conference, October 31-November 2, 1972, Columbus, Ohio: Environmental Protection Agency National Environmental Research Center, p 145-148, February 1973. 1 tab, 10 ref.

Descriptors: *Monitoring, *Trace elements, *Water pollution control, Water pollution sources, *Path of pollutants, Water analysis.

Monitoring for trace metals in the aquatic environment involves source and near-source sampling, as well as ambient monitoring for baseline data and trend analysis. A number of satisfactory analytical methods are available and in use to determine metals in water and waste samples. Good laboratory quality is essential to the monitoring program, and various manuals and reference samples are available from EPA to assist in establishing and maintaining efficient laboratory operations. (See also W74-09206) (Knapp-USGS)
W74-09215

MONITORING OF SOLID WASTES,
Michigan Univ., Ann Arbor.
E. A. Glysson.
In: Cycling and Control of Metals; Proceedings of Environmental Resources Conference, October 31-November 2, 1972, Columbus, Ohio: Environmental Protection Agency National Environmental Research Center, p 149-152, February 1973. 6 ref.

Descriptors: *Monitoring, *Trace elements, *Solid wastes, Landfills, Waste dumps, Water pollution sources.

Monitoring of solid wastes in general is far from adequate and for trace metals is hardly considered. More must be learned of the importance of trace metals from solid wastes upon the quality of the environment. Studies to date have not indicated that trace metals are a problem from this source, but more work needs to be done. (See also W74-09206) (Knapp-USGS)
W74-09216

THE USE OF ION SPECIFIC ELECTRODES FOR CHEMICAL MONITORING OF MARINE SYSTEMS: PART I--THE AMMONIA ELECTRODE AS A SENSITIVE WATER QUALITY INDICATOR PROBE FOR RECIRCULATING MARICULTURE SYSTEMS,
Delaware Univ., Newark. Coll. of Marine Studies.
R. F. Srna, C. Epifanio, M. Hartman, G. Pruder, and A. Stubbs.
Available from NTIS, Springfield, Va 22151 as COM-73-11644, price $2.75 printed copy; $1.45 microfiche. Report DEL-SG-14-73, June 1973. 20 p, 4 fig, 4 tab, 4 ref. NOAA Grant 2-35223.

Descriptors: *Monitoring, *Ammonia, *Aquiculture, *Electrodes, Water chemistry, Water analysis, Sea water, Nutrients, Respiration, Water quality.

The ammonia ion specific electrode was tested as a water quality probe in recirculating mariculture systems. Its precision and ease of use make it

possible for the ammonia level in the system to be monitored routinely and the ammonia concentration used as a master variable, to detect rapid system changes involving both physical and biological perturbations. (Knapp-USGS)
W74-09220

HIGH-RESOLUTION ANALYSES OF REFRACTORY ORGANIC CONSTITUENTS IN AQUEOUS WASTE EFFLUENTS,
Oak Ridge National Lab., Tenn.
R. L. Jolley, W. W. Pitt, Jr., and C. D. Scott.
Available from NTIS, Springfield, Va. 22151 as CONF-730401-3 - Price $3.00 printed copy; $1.45 microfiche. 1973. 23 p, 6 fig, 2 tab, 16 ref.

Descriptors: *Chemical analysis, *Organic matter, *Waste water(Pollution), *Pollutant identification, *Chromatography, *Anion exchange, Flame photometry, Spectrophotometry.

Organic contaminants in domestic sanitary waste treatment plant effluents may be analyzed using high-resolution analytical systems developed at the Oak Ridge National Laboratory. These analyzers utilize high-pressure, anion exchange chromatography for separation of molecular-constituents in effluent concentrates. The separated compounds are detected using UV-photometry, cerate oxidimetry, or phenol-sulfuric acid colorimetry for UV-absorbing, oxidizable, or carbohydrate constituents respectively. Over 100 constituents are separated and detected from a typical domestic primary sewage treatment plant effluent. More than 50 constituents are separated from a typical domestic secondary sewage treatment plant effluent; of these, 9 were identified and 8 quantified. Preliminary results using the analyzers to study the effects of chlorination on sewage effluents indicate that several stable chlorinated organic residuals are formed during chlorination. (Knapp-USGS)
W74-09226

CHEMICAL COMPOSITION OF WATER SUPPLIES TO NAVAL AND MARINE CORPS AIR STATIONS,
Naval Air Development Center, Warminster, Pa. Materials Engineering Section.
W. C. Hallow.
Available from NTIS, Springfield, Va. 22151 as AD-757 335 - Price $3.00 printed copy; $1.45 microfiche. Report No NADC-72260-VT, December 1972. 14 p, 5 fig, 5 tab, 3 ref.

Descriptors: *Water quality, Aircraft, *Airports, *Military reservations, *Water supply, *Dissolved solids, *Chlorides, Texas, California, Treatment facilities.
Identifiers: Aircraft wash-water.

A survey was made of the quality of water supplies at Naval and Marine Corps Air Stations both within the United States and overseas to aid in the design and location of new water rinse facilities for aircraft. In addition to the total dissolved solids (TDS) and chloride content, each water analysis includes the pH, carbonate and noncarbonate hardness, and the concentration of several ions found in the water. Only two factors, the TDS and the chloride concentrations, need to be considered in determining if a water supply is suitable for rinsing aircraft. Eleven air stations in Texas and in southern California report high TDS and chloride concentrations. Five of the 13 overseas stations reported have high TDS and chloride concentrations. The water supply at overseas stations is generally comparable to stations within the Continental United States. (Knapp-USGS)
W74-09227

ANALYSIS OF NATURAL SYSTEMS,
Battelle-Pacific Northwest Lab., Richland, Wash. Environmental and Life Sciences Div.
For primary bibliographic entry see Field 5C.
W74-09234

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING THE DRESDEN NUCLEAR POWER STATION, MORRIS, ILLINOIS, SEPTEMBER 1968,
EG and G, Inc., Las Vegas, Nev.
P. K. Boyns, and M. D. Sevart.
Available from NTIS, Springfield, Va., as ARMS 68.6.8; $5.45 per copy, $1.45 microfiche. Report No ARMS-68.6.8, December 1973. 79 p, 60 fig, 5 tab.

Descriptors: *Nuclear powerplants, *Monitoring, *Surveys, Assay, Environment, Air pollution, Water pollution, Soil contamination, Fallout, Effluent, Rivers, Marshes, Remote sensing, Meteorology, *Illinois, *Remote sensing.

The Aerial Radiological Measuring System (ARMS), operated for the U.S. Atomic Energy Commission, was used to perform surveys of several operational and non-operational reactor sites during the summer months of 1968. The data collected on these surveys included aerial photographs of the installations. Aerial radiation survey data includes exposure rates normalized to 3 feet above the ground plus gamma ray spectral charts, effluent characterization for operational sites (intensity rates and isotope constituents), and pertinent descriptive information of the installation. This report contains the data for the survey of the Dresden Nuclear Power Station and surrounding area, including an effluent plume track. (Houser-ORNL)
W74-09250

5B. Sources Of Pollution

DECHLORINATION OF DDT BY AEROBACTER AEROGENES,
Bureau of Sport Fisheries and Wildlife, Denver, Colo. Fish-Pesticide Research Lab.
G. Wedemeyer.
Science, Vol 152, No 3722, p 647, April 29, 1966.

Descriptors: *Biodegradation, Pesticides, Bacteria, *DDT, *DDD, Oxygen requirements, Metabolism, Inhibition, Iron, *Pesticide residues.
Identifiers: *Dechlorination, *Aerobacter aerogenes.

Dechlorination of DDT to DDD in higher animals requires the presence of molecular oxygen, but in microorganisms the presence of oxygen hinders dechlorination. In cell-free preparations of Aerobacter aerogenes, the use of selected metabolic inhibitors indicated that reduced Fe(11) cytochrome oxidase was responsible for DDT dechlorination. This finding may possibly explain the persistence of DDT residues in soils and sediments.
W74-08739

ECOSYSTEM OF THE SALTON SEA,
California State Univ., Long Beach. Dept. of Microbiology.
For primary bibliographic entry see Field 4A.
W74-08752

PENETRABILITY AND HYDRAULIC CONDUCTIVITY OF DILUTE SULFURIC ACID SOLUTIONS IN SELECTED ARIZONA SOILS,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
For primary bibliographic entry see Field 2G.
W74-08765

SALINITY PROBLEMS OF THE SAFFORD VALLEY: AN INTERDISCIPLINARY ANALYSIS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
A. B. Muller.
In: Hydrology and Water Resources of Arizona and the Southwest, Proceedings of the 1973 meetings of the Arizona Section-Amer. Water Resources Assn., and the Hydrology Section-Arizona Academy of Science, Tucson, p 136-144, (1973). 5 fig, 9 ref.

Descriptors: *Salinity, *Water quality, *Leakage, *Agricultural runoff, *Crop production, Cotton, Alfalfa, *Arizona, Aquifer systems, Artesian aquifers, Deep wells, Salts, Salt tolerance, Water pollution sources, Irrigation water, Water quality control.
Identifiers: *Safford Valley(Ariz).

A change in groundwater quality, averaging approximately +0.129 millimhos electrical conductivity and +35 ppm chloride per year, has been documented between 1940 and 1972 with data from 10 long-term sample wells in the Safford Valley of southeastern Arizona. Decrement of water quality of the surficial aquifer can be attributed to 4 major mechanisms: An increase in salinity because of saline water leakage from the artesian aquifer, stimulated by pumping-caused reduction of confining pressure and by the puncture of the cap beds by deep wells; Water reaching the aquifer from natural recharge, if passed through soluble beds; Lateral movement of water through similar deposits, as well as Concentration and infiltration of agricultural water. An economic analysis of the area, based on modeling of representative farm units and projected salinity trends for a significant time beyond the limits of prediction, shows that cotton will remain an economic crop but that alfalfa will no longer be grown by 2040. Methodology described indicates low pumping influences salinity changes. Salinity controls for the area are outlined. (Muller-Arizona)
W74-08769

HOUSEHOLD WASTEWATER CHARACTERIZATION,
Baxter and Woodman, Inc., Crystal Lake, Ill.
K. Ligman, N. Hutzler, and W. C. Boyle.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE1, p 201-213, February 1974. 9 tab, 46 ref.

Descriptors: *Waste water, *Surveys, *Suspended solids, *Waste disposal, Sampling, Domestic wastes, Biochemical oxygen demand, Water quality, *Pollutant identification.

The types of waste waters generated in a domestic household and their respective waste water characteristics were defined through the use of a waste water generation survey, a waste water sampling survey, and literature reviews. Based on data collected, a simulated waste loading was adopted for use in waste water treatment and disposal studies. The average four person household uses 190 gallons of water a day generating 0.695 lb/day BOD5 and 0.797 lb/day of suspended solids. Current research efforts employing this simulated waste water loading will define the limitations and operational requirements of given unit processes to meet a requisite water quality for ultimate disposal. (Merritt-FIRL)
W74-08770

THORIUM ISOTOPE CONTENT IN RIVER WATER IN JAPAN,
Meteorological Research Inst., Tokyo (Japan).
Y. Miyake, Y. Sugimur, and T. Yasujima.
Papers in Meteorology and Geophysics, Vol 24, No 1, p 67-73, March 1973. 1 fig, 6 tab, 6 ref.

Descriptors: Rivers, *Isotope studies, *Radioisotopes, *Radioactive wastes, Investigations, Analysis, Analytical techniques, Water pollution.
Identifiers: *Japan, *Thorium.

The concentrations of thorium isotopes Th232, Th230, and Th238 were determined in the river water collected at 10 main rivers in Japan. The concentration of dissolved Th232 in river water was one order of magnitude higher than that in the Pacific surface waters. The weighted averages were 2.7 times 10 to the minus 8th power g/liter for Th232 and 2.8 times 10 to the minus 13th power g/liter for Th230. The constancy in Th232 and Th230 concentration with time was observed, but the concentration of Th238 in river water was quite variable. Accordingly, the Th238/Th232 activity ratio showed a wide range of variations from 37 to 0.65 during the period of study. (Merritt-FIRL)
W74-08772

PHOSPHORUS AND CARBON IN LAKE POLLUTION,
Basf-Wyandotte Chemical Corp., Mich.
For primary bibliographic entry see Field 5C.
W74-08775

FACTORS AFFECTING THE PERSISTENCE OF PESTICIDES IN THE SOIL,
Rothamsted Experimental Station, Harpenden (England).
C. A. Edwards.
Chemistry and Industry, No 5, p 190-193, March 2, 1974. 1 fig, 48 ref.

Descriptors: *Insecticides, *Soil contamination, Soil chemical properties, *Soil management, Soil environment, Temperature, Rainfall, Soil moisture, Soil physical properties, Soil types, *Pesticide residues, *Path of pollutants.

The factors that influence the persistence of organochlorine insectides in soil can be separated into chemical, soil, environmental, and human factors. Under chemical characteristics the most important factor is the intrinsic stability of the chemical with the solubility of the pesticide being of considerable influence. Soil type and particle size as well as the amount of organic matter in a soil greatly affect how long the insecticide will remain. The most important environmental factors include temperature, rainfall, and soil moisture. Factors such as cultivation, weathering of the soil surface, and plant selection can influence the persistence of insecticides relative to the management of the soil. (Sandoski-FIRL)
W74-08793

THE INVESTIGATION OF BIODEGRADABILITY OF BRANCHED NONYL PHENOL ETHOXYLATES,
Swedish Water and Air Pollution Research Lab., Stockholm.
For primary bibliographic entry see Field 5D.
W74-08798

EFFECT OF LONG-TERM MANAGEMENT ON PHYSICAL AND CHEMICAL PROPERTIES OF THE COSHOCTON WATERSHED SOILS,
Agricultural Research Service Coshocton, Ohio. North Appalachian Experimental Watershed.
For primary bibliographic entry see Field 4D.
W74-08813

LEACHING REQUIREMENT STUDIES: SENSITIVITY OF ALFALFA TO SALINITY OF IRRIGATION AND DRAINAGE WATERS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3C.
W74-08815

CONTENT OF PLUTONIUM IN RIVER WATER IN JAPAN,
Meteorological Research Inst., Tokoyo (Japan).
Y. Miyake, Y. Sugimura, and K. Saruhashi.
Papers in Meterology and Geophysics, Vol 24, No 1, p 75-78, March, 1973. 1 fig, 1 tab, 6 ref.

Descriptors: Rivers, *Radioactive wastes, Fallout, Water pollution, Investigations, Waste disposal, Water pollution sources.
Identifiers: *Japan, *Plutonium.

The content of plutonium in the water of eight main rivers in Japan was determined. The average value of the total content of plutonium is 0.0014pCi/liter in which .0004 pCi/liter is contained in the suspended matter. The annual runoff plutonium is only 0.12% of the accumulated plutonium on land. This suggests that the fallout plutonium is firmly adsorbed on soil surface and is difficult to leach out. (Merritt-FIRL)
W74-08821

SIMULATION OF DISSOLVED OXYGEN PROFILE,
Worcester Polytechnic Inst., Mass. Dept. of Mathematics.
G. C. Sornberger, and K. Keshavan.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 99, No EE4, Paper 9943, p 479-488, August 1973. 3 fig, 6 ref, append. OWRR C-3027(3674)(2).

Descriptors: *Dissolved oxygen, *Oxygen demand, *Simulation analysis, Mathematical models, Oxygen sag, Stochastic processes, *Thermal pollution, *Path of pollutants, Variability.

A stochastic mathematical model describes the probability distribution of dissolved oxygen in streams which have received an input of both thermal and organic pollution. The stochastic model is siumlated under conditions of constant and variable temperature, and the results of the simulation are compared with the mean values predicted by recent deterministic models. The simulation provides an estimate of the variability in the DO level to be expected at different points as well as a means of generating typical oxygen sag curves for a stream. (Knapp-USGS)
W74-08823

THE DEVELOPMENT OF PHOSPHATE FREE HEAVY DUTY DETERGENTS,
Gillette Co. Research Inst., Rockville, Md.
For primary bibliographic entry see Field 5C.
W74-08830

INVESTIGATION OF SURFACE FILMS - CHESAPEAKE BAY ENTRANCE,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 5A.
W74-08831

NITROGENOUS COMPOUNDS IN THE ENVIRONMENT.
Environmental Protection Agency, Washington, D.C. Hazardous Materials Advisory Committee.
Copy Available from GPO Sup Doc, $2.20; microfiche from NTIS as PB-232 959 $1.45. Environmental Protection Agency Report EPA-SAB-73-001, December 1973, 187p.

Descriptors: *Feed lots, *Waste water treatment, Landfills, Ecology, Water pollution, Water pollution effects, *Water pollution control, Groundwater, Run-off, Urban areas, Sewage, Industrial wastes, Sanitary engineering, Air pollution, Nitrites, *Nitrogen compounds, Fertilizers, Wastes, Food supply, *Farm wastes.
Identifiers: Sanitary landfill leachate, Nitrosamines.

This report is a series of papers on the sources and methods of control and the environmental and health effects of nitrogenous compounds. Diverse aspects of municipal and industrial sources are discussed--waterborne, atmospheric, agricultural, and industrial processes generating nitrogenous compounds. Attention is given to nitrogenous materials in waste and surface waters, efficiency of sewage treatment, effectiveness of the conventional BOD test, and the contribution of urban runoff and landfill leakage to the overall nitrogen load in the environment. Concentrations, sources, sinks, the transformation of nitrogenous materials in the lower atmosphere, control measures for stationary and mobile sources, retrofit systems for used cars, and new engine systems are reviewed. Plant nutrients, including fertilizers, and animal wastes are considered. The growing problems resulting from concentrated centralized livestock feedlots and methods of control are pointed out. Nitrogen is discussed as a nutrient essential to living organisms and as a toxicant within the aquatic environment. The carcinogenicity of nitrosamines and their precursors is described as a potential danger to health. Individual nitrogenous compounds are appropriately identified through the report. Analytical procedures for the identification and quantification of nitrogenous compounds are reviewed. Presented are the major concerns regarding nitrogenous compounds in the environment as these related to the following Environmental Protection Agency activities: research, monitoring, and regulation. (Malone-EPA)
W74-08835

LARGE-SCALE MASS BALANCE FOR LEAD IN SOUTHERN LAKE MICHIGAN,
Illinois Univ., Chicago. Dept. of Energy Engineering.
A. C. Cogley.
Available from the National Technical Information Service as PB-232 956 $3.00 in paper copy, $1.45 in microfiche. Illinois University, Urbana, Water Resources Center Research Report No 85, December 1973. 18 p, 1 fig, 1 tab, 20 ref. OWRR A-057-ILL (1), 14-31-0001-3813.

Descriptors: *Lake Michigan, *Aerosols, *Lead, Air pollution, *Path of pollutants, *Illinois, Dispersion, Model studies, Turbulet boundary layers.
Identifiers: *Mass-balance(Lead), *Atmospheric transport, Chicago area(Ill.)

A large-scale, order-of-magnitude mass balance for lead in the near field of Chicago (the source) is presented. Both experimental data and simple physical modeling are used to estimate the transport of lead from the major sources to the near-field sinks of Southern Lake Michigan, its watershed soil, and the surroundings (losses from the system under question). The results show that atmospheric transport of lead aerosols to a sink like Lake Michigan is about two orders of magnitude greater than other transport mechanisms. To perform a detailed (small-scale) mass balance for lead, in support of the large-scale results, a complete model of atmospheric, aerosol transport and deposition is necessary and dominant. Although much work has been done on (free) turbulent dispersion of aerosols and aerosol diposition through precipitation, little is known about the dry deposition of aerosols from a turbulent boundary layer. An aerosol, turbulent dispersion model with a realistic boundary condition at the fluid-ground interface needs to be developed. A coordinated experimental program for measuring (dry) aerosol flux to the ground (and Lake) should be initiated.
W74-08836

NITROGEN: A PROBLEM OF DECREASING DILUTION,
Imperial Coll. of Science and Technology, London (England). Dept. of Mathematics.
R. Scorer.
New Scientist, Vol 62, No 895, p 182-184, April 25, 1974. 2 fig.

Descriptors: *Nitrogen, Rivers, *Nitrates, Human populations, Environmental effects, Potable water, Water pollution sources.
Identifiers: Nitrogen pollution, *Thames River(U.K.), Lee River(U.K.), United Kingdom.

Nitrogen pollution levels in the Thames and Lee rivers in Great Britain have risen due to population pressures. Drinking water must be kept under 11.3 mg of nitrogen per liter in order to be potable for babies. Adult limits are about 20 mg nitrogen per liter. The use of river water in towns and the population served by sewage works have both increased. An additional problem is warm winters, such as 1973-1974, where a greater fraction of the waste became nitrate, rather than going into the air as ammonia. (Prague-FIRL)
W74-08864

ENVIRONMENTAL PROTECTION AND ENERGY CONSERVATION GO HAND-IN-HAND.
Coal Age, Vol 79, No 4, p 113-116, April, 1974. 2 fig, 2 tab.

Descriptors: *Energy, *Environmental effects, *Mining, Conservation, Industrial wastes, Air pollution effects, Standards.
Identifiers: *Environmental protection, Industrial pollution, Auto emissions standards.

Major energy-environmental interfaces and problems are discussed. Mining industries, especially base metal producers such as aluminum, copper, lead, zinc, are viewed by EPA as major sources of industrial pollution. The impact of new 'clean' energy sources is proposed. Auto emissions standards are a controversial issue, both for tuning up old cars and for the prohibitive consumer costs of anti-pollution devices for new models. Shifting patterns in electricity use and the need for energy conservation, including drastic changes legislated by Congress are also noted. (Prague-FIRL)
W74-08865

DETERMINING THE BIODEGRADABILITY OF ORGANIC COMPOUNDS.
Effluent and Water Treatment Journal, Vol 14, No 3, p 161, March, 1974.

Descriptors: *Instrumentation, *Oxygen demand, *Pollutants, *Organic compounds, *Biodegradation, Effluents, Water pollution control, Measurement, Surface waters, Industrial wastes, Pollutant identification.
Identifiers: *Organic carbon analyser, Model 915 TOC Analyser, Water pollution control plants.

Organic carbon in aqueous solution or suspension may be measured by catalytically oxidizing it to carbon dioxide, with a Model 915 TOC Analyser by Beckman Instruments. One application of the total organic carbon analyser is the determination of degradability of various organics by a given culture in the activated sludge treatment process. The process incorporates the aerobic oxidation of organic compounds to simple, harmless inorganics such as carbon dioxide, water, nitrates, sulphates, and cellular organic matter. Because widespread requirements for determining organic pollution of water are increasing, this measurement of organic carbonaceous matter as a major oxygen-demanding pollutant is important. Total organic carbon analyser measurement is rapid and produces duplicate results on duplicate samples. The process is applicable for measurement of effluents from water pollution control plants, industrial waste treatment plants, and the measurement of organics in surface waters. (Prague-FIRL)
W74-08867

BORON RELEASE FROM DEIONIZERS,
California Univ., Los Angeles. Dept. of Environmental Horticulture.
J. L. Paul, and W. F. Thornhill.
Industrial Water Engineering, Vol 11, No 1, p 6, January/February, 1974.

Descriptors: *Boron, *Toxicity, *Plant pathology, Water quality, *Irrigation, Ion exchange, Distillation.
Identifiers: *Deionized water.

The release of boron from deionized water and its pollution and toxicity effects are discussed. When water is used for irrigation, it is necessary to consider boron concentration in assessing water quality because boron is toxic to plants at 1 ppm or more in irrigation water. Deionized water, produced from a mixed bed unit, was used for irrigating greenhouse plants and scattered but recurring cases of boron toxicity were noted. Samples of deionized water collected just before and during breakthrough and analyzed for boron, pH, and electrical resistance showed that boron reached a maximum concentration of 15 mg/liter. Most plant species die if irrigated continually with this concentration. (Merritt-FIRL)
W74-08873

ENVIRONMENTAL RADIATION DOSE CRITERIA AND ASSESSMENT-PATHWAY MODELING AND SURVEILLANCE,
Brookhaven National Lab., Upton, N.Y. Health Physics and Safety Div.
A. P. Hull.
IEEE Transactions on Nuclear Science, Vol NS-21, No 1, p 491-495, February, 1974. 2 fig, 3 tab, 24 ref.

Descriptors: *Radiation, *Nuclear powerplants, *Safety, Nuclear physics, Radioactive wastes, Measurements, *Radioactivity, Monitoring, Nuclear reactors, *Path of pollutants.
Identifiers: *Environmental radiation doses.

The development of environmental radiation dose criteria and assessment through both pathway modeling and environmental surveillance are discussed. Considerable effort has been devoted to this end since the first utilization of nuclear reactors in the United States in the 1940's and particularly since the advent of civilian nuclear power reactors. The Atomic Energy Commission has issued a Safety Guide calling for considerable refinement in the measuring and reporting of effluents from nuclear power plants, and has only recently issued a counterpart dealing with the measuring and reporting of radioactivity in the environs of nuclear power plants. The EPA has also recently issued a guide for the surveillance of environmental radioactivity. Currently, power reactor operators are being required by the AEC Regulatory Staff to conduct detailed, sensitive environmental surveillance at levels consistent with proposed concentration limits. (Merritt-FIRL)
W74-08875

INSTRUMENTATION AND ENVIRONMENTAL RADIATION ASSESSMENT SYSTEMS,
Office of Radiation Programs, Washington, D.C.
C. E. Peters.
IEEE Transactions on Nuclear Science, Vol NS-21, No 1, p 470-477, February, 1974. 7 fig, 1 tab, 10 ref.

Descriptors: *Radiation, *Monitoring, *Instrumentation, Nuclear powerplants, *Surveys, Model studies, Water transfer, Radioisotopes.
Identifiers: Environmental radiation doses.

The field of radiation protection monitoring was surveyed and those applications requiring improved instrumentation or monitoring systems are identified. The application of most pressing concern are emergency response monitoring systems and systems to monitor the radiation exposure in the vicinity of nuclear power facilities. The increasing need for calculating the doses from sources of radiation exposure has generated two trends that may be of importance to the future development of nuclear instrumentation and/or monitoring systems. One trend is the increasing use of models, such as air and water transport models, to calculate the movement of radionuclides and subsequently the doses. The other trend is the increasing demand for specific radioncuclide concentration measurements, which can be used for calculating dose, rather than measurements of gross activity. (Merritt-FIRL)
W74-08876

DISTRIBUTION OF PHOSPHATES IN LAKE MARIUT, A HEAVILY POLLUTED LAKE IN EGYPT,
Alexandria Univ. (Egypt). Dept. of Oceanography.
M. A. H. Saad.
Water, Air, and Soil Pollution, Vol 2, No 4, p 515-522, December, 1973. 3 fig, 28 ref.

Descriptors: *Lakes, *Phosphates, *Distribution patterns, Seasonal, Investigations, Water pollution, *Environmental effects, Water pollution sources, *Path of pollutants.
Identifiers: *Egypt(Lake Mariut), Phosphate distribution.

Because of an increase in human population and industry around Lake Mariut, the lake has changed into a markedly eutrophic state. Severe pollution is mainly responsible for the decrease in the total fish production from 9,977,815 kg in 1961 to 1,490,600 kg in 1969. This lake continuously receives great amounts of untreated sewage and industrial wastes. Huge quantities of drainage waters rich in phosphate fertilizers enter the lake as well. The concentrations of phosphates are also increased by the liberation of autochthonous phosphates from the decomposition of massive amounts of dead phytoplankton and the stirring up of the bottom muds by wind action, which accelerates the release of adsorbed phosphates from the mineral particles. The phosphate values for Lake Mariut were several times higher than surrounding Egyptian lakes, due to the aforementioned factors. (Prague-FIRL)
W74-08881

WASTE ACCUMULATION ON A SELECTED DAIRY CORRAL AND ITS EFFECT ON THE NITRATE AND SALT OF THE UNDERLYING SOIL STRATA,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
A. C. Chang, D. C. Adriano, and P. F. Pratt.
Journal of Environmental Quality, Vol 2, No 2, p 233-237, April-June, 1973. 5 fig, 3 tab, 9 ref.

Descriptors: *Water pollution sources, Animal wastes(Wildlife), *Leaching, Nutrient removal, *Dairy industry, Nitrogen, *Nitrates, *California, Soils, Salts.
Identifiers: *Chino-Corona(Calif).

A corral was selected from a typical Chino-Corona, California area dairy to study waste accumulation and distribution on corral surfaces and to determine its effect on underlying soil strata. Waste deposited on the surface tended to accumulate in a small area of the corral; as much as 57% of the waste was in an area equaling 30% of the total corral surface. Considerable decomposition of organic matter and nitrogen loss took place during accumulation; however, collected waste samples were relatively unstable and subject to further decomposition. After a long period of dairy operations, leaching of nitrates, chlorides, and organic matter into soils was substantial. The same order of magnitude of leaching of chloride and organic carbon occurred throughout the entire corral surface. The amount of nitrate underneath the area of heavy waste accumulation was less than that in the other part of the corral. Future improvement in dairy waste management should take this into consideration in order to minimize its potential cause of ground water pollution. (Skogerboe-Colorado State)

W74-08921

NUTRIENT BALANCES FOR THE EVALUATION OF NUTRIENT SOURCES IN WATER QUALITY MANAGEMENT,
Department of the Environment, Ottawa (Ontario). Water Quality Branch.
R. H. Peters.
Water Resources Bulletin, Vol 9, No 1, p 49-53, February, 1973. 2 fig, 3 tab, 1 ref.

Descriptors: *Water pollution sources, Water quality, Water quality control, *Nutrients, Riverflow, River systems, Leaching, *Canada, *Nitrogen, *Phosphorus, *Path of pollutants.
Identifiers: *Qu'Appelle River basin(Sask).

The methodology for a nutrient balance to evaluate the sources and distribution of nutrients in a small river basin is described. Loadings for total nitrogen and phosphorus are calculated from measured nutrient concentration and river discharge data. Using a special retrieval program and a data storage and processing system, loadings are accumulated over a given time period to allow for time of passage through the basin and seasonal changes in nutrient distribution. Nutrient balances are made with the accumulated loadings to obtain the relative contribution of each nutrient source and the retention of nutrients within the basin through sedimentation and aquatic growth. The methodology has been used to study nutrients in the Qu'Appelle River Basin, Saskatchewan, Canada. (Skogerboe-Colorado State)
W74-08928

RATIONALE FOR OPTIMUM NITROGEN FERTILIZATION IN CORN PRODUCTION,
Agricultural Research Service, Beltsville, Md. Soils Lab.
For primary bibliographic entry see Field 3F.
W74-08929

DISTRIBUTION OF SELECTED TRACE METALS IN SOUTHERN LAKE MICHIGAN AND LOWER GREEN BAY,
Illinois Univ., Urbana. Dept. of Civil Engineering.
H. V. Leland, and N. F. Shimp.
Available from the National Technical Information Service as PB-232 971; $3.25 in paper copy, $1.45 in microfiche. Illinois Water Resources Center, Urbana, Research Report No 84, April 1974. 28 p, 9 fig, 3 tab, 24 ref. OWRR A-052-ILL(2). 14-31-0001-3213.

Descriptors: *Lake Michigan, *Heavy metals, *Trace elements, Sediment-water interfaces, *Path of pollutants, *Distribution patterns, *Lake sediments.
Identifiers: *Metal transport, Water-sample storage, Sediment-water interaction, *Green Bay, Trace metals.

The distribution of selected trace metals in water, suspended matter and sediments of southern Lake Michigan and in surficial sediments of lower Green Bay is described. Accumulations of As, Br, Cr, Cu, Hg, Pb, and Zn in fine-grained surficial sediments of southern Lake Michigan, apparently determined by patterns of sediment deposition, correlate closely with sediment concentrations of organic carbon and iron. Organic carbon concentrations of surficial sediments are more highly correlated with concentrations of Cu, Pb and Zn in surficial sediments of lower Green Bay than are either Fe of Mn contents. Mean concentrations of trace metals in suspended matter near the sediment-water interface of southern Lake Michigan equal or exceed amounts in surficial sediments. Horizontal (geographic) and vertical distributions of concentrations of nine trace metals (Cd, Cr, Co, Cu, Fe, Pb, Mn, Ni and Zn) in waters of southern Lake Michigan were examined during the period June-October, 1971. Distributions of Cu, Fe, Pb and Zn in filtered lake water are presented. Metal concentrations are typically highest near areas of industrialization and major tributary embouchment. Concentrations of Cu, Fe, Pb and Zn in nearshore areas of southern Lake Michigan are typically higher than concentrations in offshore waters, but this trend is inconsistent.
W74-08934

QUANTIFICATION OF POLLUTANTS IN AGRICULTURAL RUNOFF,
South Dakota State Univ., Brookings. Dept. of Civil Engineering.
J. N. Dornbush, J. R. Andersen, and L. L. Harms.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-005, $1.90; microfiche from NTIS as PB-233 134, $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-74-005, February 1974. 149 p, 24 fig, 15 tab, 73 ref. EPA Project R800400. Contract 68-01-0030.

Descriptors: Surface runoff, *Agricultural runoff, Erosion, *Nutrients, Phosphorus, *Nonpoint pollution source, Chemistry, Sediments, *Water pollution sources, Pesticides, Bacteria, *South Dakota, Bioindicators, Rainfall, Snowmelt.
Identifiers: *Runoff pollutants.

Surface runoff from snowmelt and rainfall in eastern South Dakota was measured during a three year period. The size of the research sites ranged from 7.18 to 18.69 acres, and all sites had crops of corn, oats, pasture or hayland. Composite samples of the runoff were used for various chemical, physical and biological determinations. Runoff samples from 108 snowmelt events and 36 rainfall events were collected. Equipment fabrication and installation resulted in some incomplete data for the initial year, but successful monitoring of each runoff event was accomplished thereafter. Sediment losses were considerably lower than anticipated. Pesticide concentrations were low in both water and sediment samples, and were usually less than the analytical test limits. Coliform and fecal levels were consistently greater than accepted surface water quality criteria. Most of the nutrients were found to be soluble and/or associated with snowmelt runoff. (EPA)
W74-08942

DEVELOPMENT OF PREDICTIONS OF FUTURE POLLUTION PROBLEMS,
Battelle-Columbus Labs., Ohio.
J. E. Flinn, and R. S. Reimers.
Copy Available from GPO Sup Doc as EP1.23:600/5-74.005, $2.40; microfiche from NTIS as PB-233 117, $1.45. Environmental Protection Agency, Socioeconomic Studies Series Report EPA-600/5-74-005, March 1974. 207 p, 7 fig, 41 tab. EPA Program Element 1HA095. Contract 68-01-1837.

Descriptors: *Pollutants, Pollutant identification, Air pollution, *Water pollution sources, Strip mines, *Forecasting, Land use.
Identifiers: *Future pollution problems, Mine pollution, Toxic chemicals, Fine particulates, Radiation problems.

The report describes the results of a program to identify, rank and project short- and intermediate-term future pollution problems. Identification was accomplished using three independent search approaches based on industrial production, environmental, and societal trends and activity. Primary emphasis was placed on the environmental trends as gleaned from EPA, Battelle, literature, and other sources. An initial list of problems was compiled with specific stressors identified with each. Nine ranking factors were devised to select ten 'most serious' problems from the initial list. The factors included: persistence; mobility/pervasiveness; environmental, technological, social, and political complexity; physiological risk; research needs; and bulk or volume of the pollutant. The ten problems selected by this method were further ranked in order of relative importance. The ten selected problems in rank order are as follows: (1) Impacts of New Energy Initiatives; (2) Geophysical Modifications of the Earth; (3) Trace Element (Metal) Contaminants; (4) Proliferating Hazardous and Toxic Chemicals; (5) Emissions from New Automobile Fuels, Additives, and Control Devices; (6) Disposal of Waste Sludges, Liquids, and Solid Residues; (7) Critical Radiation Problems; (8) Fine Particulates; (9) Expanding Drinking Water Contamination; and (10) Irrigation (Impoundment) Practices. Five to ten year projections were made of the ten problems which resulted. (EPA)
W74-08946

THE NUCLEAR FUEL CYCLE -- A SURVEY OF THE PUBLIC HEALTH, ENVIRONMENTAL AND NATIONAL SECURITY EFFECTS OF NUCLEAR POWER,
Union of Concerned Scientists, Cambridge, Mass.
For primary bibliographic entry see Field 5C.
W74-08947

NUCLEAR FUEL REPROCESSING: RADIOLOGICAL IMPACT OF WEST VALLEY PLANT.
For primary bibliographic entry see Field 5C.
W74-08953

HEALTH AND SAFETY LABORATORY FALLOUT PROGRAM -- QUARTERLY SUMMARY REPORT -- DECEMBER 1, 1973 THROUGH MARCH 1, 1974,
Health and Safety Lab. (AEC), New York.
E. P. Hardy, Jr.
Available: NTIS, Springfield, Va., as Rept. No. HASL-281, $7.60 per copy, $1.45 microfiche. Report No. HASL-281, April 1974. 277 p, 71 fig, 36 tab, 91 ref, 1 biblio.

Descriptors: *Monitoring, *Sampling, *Fallout, *Data collections, *Nuclear explosions, *Strontium, *Cesium, Air pollution, Water pollution, Soil contamination, Environment, Trace elements, Air, Milk, Diets, Food chains, Potable water, Assay, Public health.
Identifiers: Weapons testing, China, France, Stratosphere, *Concentration.

Current data are presented from the HASL Fallout Program and the Technical University of Wroclaw, Poland. The initial section of the report consists of interpretive reports and notes on the termination of aircraft sampling in the stratosphere; stratospheric radioactivity from Chinese and French nuclear tests; concentrations of Sr-90 and Cs-137 in environmental samples from Poland; stratospheric radionuclide inventories; and fallout of trace metals in New York City. Subsequent sections include tabulations of radionuclide levels in fallout, surface air, stratospheric air, milk, diet, tap water, and human bone. A bibliography of recent publications related to radionuclide studies is also presented. (See also W74-08955 and W74-08956) (Houser-ORNL)
W74-08954

RADIOACTIVITY DISTRIBUTION IN THE STRATOSPHERE FROM CHINESE AND FRENCH HIGH YIELD NUCLEAR TESTS (1967-1970),
National Oceanic and Atmospheric Administration, Silver Springs, Md. Air Resources Labs.
K. Telegadas.
In: Report No. HASL-281, p I-3 to I-112, April 1974. 49 fig, 14 tab, 48 ref.

Descriptors: *Nuclear explosions, *Radioactivity, *Distribution, *Meteorology, *Measurement, *Assay, Monitoring, Air pollution, Fallout, Water pollution, Degredation, Withdrawal, Summer, Autumn, Winter, Radioisotopes, Air pollution, Water pollution, Remote sensing.
Identifiers: France, China, Stratosphere, Concentration.

Radioactivity concentrations and ratios in stratospheric air samples up to 30 km described the latitudinal and vertical spread of debris from a stratospheric source. China detonated 3 MT devices at 40 deg N, 90 deg E on June 17, 1967; December 27, 1968; September 29, 1969, and October 14, 1970. Estimates of the initial source distribution for all four tests and the depletion of the resulting stratospheric burdens are discussed. Meteorological data pertinent to the four high yield tests, such as an estimate of the temperature profile at the time of detonation and the Northern Hemisphere constant level stratospheric maps up to 50 mb were used to explain, in part, the observed changes in the latitudinal distribution of radioactivity following each test. Common features of the radioactivity patterns for the four Chinese tests have been incorporated into composite pictures of the seasonal latitudinal distribution of radioactivity following summer, fall, and winter nuclear tests. (See also W74-08154) (Houser-ORNL)
W74-08955

HEALTH AND SAFETY LABORATORY FALLOUT PROGRAM -- QUARTERLY SUMMARY REPORT -- DECEMBER 1, 1973 THROUGH MARCH 1, 1974, (APPENDIX),
Health and Safety Lab. (AEC), New York.
For primary bibliographic entry see Field 5A.
W74-08956

ENVIRONMENTAL ASPECTS OF PLUTONIUM -- A SELECTED, ANNOTATED BIBLIOGRAPHY.
Oak Ridge National Lab., Tenn.
Available: NTIS, Springfield, Va., as Rept. No. ORNL-EIS-72-21; $13.60/copy; $1.45 microfiche. Report No. ORNL-EIS-72-21, September 1972. 391 p, 785 ref, 5 indexes.

Descriptors: *Bibliographies, Publications, *Plutonium, *Environment, Air pollution, Water pollution, Water pollution sources, Soil contamination, Ecology, Ecosystems, *Abstracts, Computer programs, Data storage and retrieval.

This bibliography is the first publication of the Environmental Plutonium Data Base, which is being assembled for computer storage and retrieval. The abstracts report observations and measurement methods about or applicable to plutonium in the environment. The subjects of central concern were the movement of plutonium through the environment, particularly that of the Nevada Test Site with emphasis on its availability to man. Related material, such as biological effects of plutonium, interaction of plutonium with various ecosystems, dispersion of fallout from nuclear explosions, was also included. Subject categories include the mode of input to the environment and its assessment. (See also W74-08958) (Houser-ORNL)
W74-08957

ENVIRONMENTAL ASPECTS OF PLUTONIUM AND OTHER ELEMENTS - A SELECTED ANNOTATED BIBLIOGRAPHY.
Oak Ridge National Lab., Tenn.
Available: NTIS, Springfield, Va., as Rept. No. ORNL-EIS-73-21 (Suppl. 1). $10.60/copy; $1.45 microfiche. Report No. ORNL-EIS-73-21 (Suppl. 1), August 1973. 491 p, 884 ref, 6 indexes.

Descriptors: *Bibliographies, Publications, *Abstracts, *Environment, *Plutonium, Americium, Uranium, Water pollution, Water pollution sources, Soil contamination, Ecology, Ecosystems, Path of pollutants, Human population, Public health, Computer programs, Data storage and retrieval.

A supplement to the bibliography (ORNL-EIS-72-21) published by the Environmental Plutonium Data Base Group contains an additional 884 references that have been prepared for computer storage and retrieval. The deposition and movement of plutonium, americium, and uranium and their pathway through terrestrial and aquatic ecosystems to man are emphasized. An effort is made to include numerical data in the abstracts and to refer to relevant tables (in the comment field). Indexes are given for authors, permuted titles, subject categories, keywords, publication description, geographic location, and taxonomy. (See also W74-08957) (Houser-ORNL)
W74-08958

THE INFLUENCE OF LIQUID WASTE DISPOSAL ON THE GEOCHEMISTRY OF WATER AT THE NATIONAL REACTOR TESTING STATION, IDAHO: 1952-1970,
Geological Survey, Idaho Falls, Idaho. Water Resources Div.
J. B. Robertson, R. Schoen, and J. T. Barraclough.
Available from NTIS, Springfield, Va, as IDO-22053, $7.60/copy, $1.45 microfiche. Report No IDO-22053, February 1974. 243 p, 74 fig, 16 tab, 104 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Radioactive waste disposal, *Idaho, *Geochemistry, Hydrology, Meteorology, Surface water, Groundwater, Water pollution, Water pollution sources, Geology, Geohydrology, Groundwater recharge.
Identifiers: National Reactor Testing Station(Idaho Falls), *Snake River(Idaho).

A summarized evaluation is presented of the geology, hydrology, and water geochemistry of the National Reactor Testing Station (NRTS), Idaho and the associated influences of subsurface liquid-waste products discharged from the NRTS facilities. The progressive buildup, distribution, and changes of both radioactive and chemical wastes are analyzed for the total disposal period -- 1952-70. Of principal concern is the fate of wastes discharged from the NRTS in the Snake River Plain aquifer, an extremely large and productive groundwater system underlying the vast eastern Snake River Plain. Since 1952, the NRTS facilities (primarily the Test Reactor Area -- TRA, Idaho Chemical Processing Plant -- ICPP, and the Naval Reactor Facility -- NRF) have discharged 1.6 x 10(10) gallons of liquid waste containing 7 x 10(4) curies of radioactivity and about 1 x 10(8) pounds of chemicals to the subsurface. The discharge has been disposed in wells and seepage ponds. The principal waste products include tritiated water, strontium-90, cesium-137, cobalt-60, sodium chloride, chromates, and heat. Wastes at the NRTS have been distributed in the Snake River Plain aquifer and overlying bodies of perched groundwater according to hydrologic and geochemical controls. (Houser-ORNL)
W74-08962

THE DISTRIBUTION OF COBALT-60 RUTHENIUM-106 AND CESIUM-137 AMONG SUSPENDED AND DISSOLVED PARTICLES IN WHITE OAK LAKE,
Oak Ridge Gaseous Diffusion Plant, Tenn.
W. T. Lammers.
Available from NTIS, Springfield, Va, as Rept No K-1758; $4.00 per copy, $1.45 microfiche. Report No K-1758, October 1968. 20 p, 1 fig. 3 tab, 9 ref.

Descriptors: *Radioisotopes, *Radioactive wastes, Water pollution, Assay, Analytical techniques, Centrifugation, *Cobalt, *Ruthenium, *Cesium, Radiochemical analysis, Absorption, *Distribution, Isotope fractionation, Data collections, *Tennessee.
Identifiers: *White Oak Lake(Tenn).

White Oak Lake, a small impoundment that receives low level radioactive waste from the operation of the Oak Ridge National Laboratory, was sampled routinely during a 14-month period from November 8, 1966, to January 2, 1968. Each sample was centrifugally fractionated into selected particulate fractions and a dissolved materials fraction. These fractionations were extracted primarily to determine the feasibility of employing centrifugal techniques for isolating and concentrating waterborne particulate materials for study. In addition, the objective was to establish the relation between quantity, type, and surface- or bioactivity of the particles in a fraction and the accumulation of radionuclides by that fraction. The fractions isolated from samples of White Oak Lake water were subjected to radiochemical analysis. Linear correlations were calculated for several combinations of the data. From this statistical analysis and interpretation, the pattern of uptake and distribution of three radionuclides (Cobalt-60, Ruthenium-106, and Cesium-137) in the aquatic environment is better understood. (Houser-ORNL)
W74-08964

SEPARATION AND ANALYSIS OF NATURAL WATER.
Davidson Coll., Biology Div.
For primary bibliographic entry see Field 5A.
W74-08969

ENVIRONMENTAL RADIOACTIVITY IN THE FAROES IN 1972,
Danish Atomic Energy Commission, Risoe. Research Establishment.
A. Aarkrog, and J. Lippert.
Available from NTIS, Springfield, Va., as RISO 292, $4.00 per copy, $1.45 microfiche. Report No 292, July 1973. 21 p, 8 fig, 18 tab, 6 ref.

Descriptors: Environment, *Radioactivity, *Monitoring, Measurement, *Fallout, *Strontium, *Cesium, Precipitation(Atmospheric), Grasses, Milk, Food, Fish, Vegetable crops, Oceans, Potable water, Aquatic plants, Human population, Diets.
Identifiers: *Faroes.

Measurements of fall-out radioactivity in the Faroes in 1972 are presented. Sr-90 (and Cs-137 in most instances) was determined in regularly collected samples of precipitation, grass, milk, lamb, fish, sea water, bread, and drinking water. In addition, analyses of spot samples of potatoes, sea plants, vegetables, eggs, and human bone were carried out. Estimates of the mean contents of Sr-90 and Cs-137 in the human diet in the Faroes in 1972 are given. (Houser-ORNL)
W74-09086

ENVIRONMENTAL RADIOACTIVITY IN DENMARK IN 1972,
Danish Atomic Energy Commission, Risoe. Research Establishment.
A. Aarkrog, and J. Lippert.
Available NTIS, Springfield, Va., as RISO 291, $7.00 per copy, $1.45 microfiche. Report No 291, June 1973. 99 p, 46 fig, 85 tab, 20 ref, 3 append.

Descriptors: Environment, *Radioactivity, *Fallout, Measurement, *Strontium, *Cesium, Precipitation(Atmospheric), Soils, Groundwater, Oceans, Grasses, Milk, Foods, Potable water, Air, Aquatic plants, Human population, Diets.
Identifiers: *Denmark.

The measurement of fall-out radioactivity in Denmark in 1972 is described. Strontium-90 was determined in samples from all over the country of precipitation, soil, groundwater, sea water, grass, dried milk, fresh milk, grain, bread, potatoes, vegetables, fruit, total diet, drinking water, and human bone. Furthermore Sr-90 was determined in local samples of air, rain water, grass, sea plants, fish, and meat. Caesium-137 was determined in soil, sea water, milk, grain products, potatoes, vegetables, fruit, total diet, and meat, and Cs-137 was measured by wholebody counting in persons from a control group at Riso. Estimates

of the mean contents of radiostrontium and radiocaesium in the human diet in Denmark in 1972 are given. The gamma-background was measured regularly at locations around Riso, at ten of the State experimental farms and in an area in Zealand, one in Jutland where future nuclear power plants might be located, and along the shores of the Great Belt. Regular surveys of environmental samples from the Riso area are included. (Houser-ORNL)
W74-09087

ENVIRONMENTAL RADIOACTIVITY IN GREENLAND IN 1972,
Danish Atomic Energy Commission, Risoe. Research Establishment.
A. Aarkrog, and J. Lippert.
Available from NTIS, Springfield, Va., as Riso 293, $4.00 per copy, $1.45 microfiche. Report No 293, July 1973. 17 p, 5 fig, 9 tab, 4 ref.

Descriptors: Environment, *Radioactivity, Measurement, *Assay, *Monitoring, *Fallout, *Cesium, *Strontium, Precipitation(Atmospheric), Oceans, Vegetation, Animal population, Potable water, Human population, Diets.
Identifiers: *Greenland.

Measurements of fallout radioactivity in Greenland in 1972 are reported. Strontium-90 (and Caesium-137 in most instances) was determined in samples of precipitation, sea water, vegetation, animals, and drinking water. Estimates of the mean contents of Sr-90 and Cs-137 in the human diet in Greenland in 1972 are given. (Houser-ORNL)
W74-09088

ARTIFICIAL RECHARGE--STATE OF THE ART,
Geological Survey, Lubbock, Tex.
For primary bibliographic entry see Field 4B.
W74-09091

A BACTERIAL METHYLMERCURY-MINERALIZING ACTIVITY IN RIVER SEDIMENTS,
Brussels Univ. (Belgium). Laboratorium voor Ekologie en Systematiek.
G. Billen, C. Joiris, and R. Wollast.
Water Research, Vol 8, No 4, p 219-225, April 1974. 4 tab, 16 ref.

Descriptors: *Mercury, *Bottom sediments, Biodegradation, Biochemistry, Heavy metals, Path of pollutants, Bacteria, Ecology.
Identifiers: *Methyl mercury, *Belgium(Sambre River).

Bacterial activity involving mineralization of methylmercury was found in bottom sediments of the Sambre River (Belgium), in a zone highly polluted with inorganic mercury. The possibility that biological production of toxic methylmercury compounds occurs in such a medium gives a great ecological significance to this finding. The mineralizing capacity of the community can be increased in response to increased concentrations of methylmercury, probably by means of the selection of methylmercury-resistant bacterial species. Because of this adaptation, it is suggested that some equilibrium can be reached between the degradation of methylmercury and its addition to, or its production in, mineral mercury-polluted environments. (Knapp-USGS)
W74-09092

A SIMPLE SIMULATION METHOD FOR RIVER SELF-PURIFICATION STUDIES,
Centre Belge d'Etude et de Documentation des Eaux, Liege.
F. Edeline, and G. Lambert.
Water Research, Vol 8, No 5, p 297-306, May 1974. 10 fig, 28 ref.

Descriptors: *Self-purification, *Oxygen demand, *Oxygen sag, Nitrification, Mathematical models, Equations, Mixing, Reaeration, Dissolved oxygen, *Simulation analysis.

A simple simulation system is described for the study of river self-purification processes. A linear relationship between the organic load and the critical deficit on the sag curve was obtained for each temperature, corresponding to 36%-52% assimilation. The rate is not constant, and the monomolecular theory is not suitable to describe the results. Two distinct phases are observed. Nitrification appears as a second and distinct sag in the oxygen curve. It is limited by oxygen transfer and equilibrates at an 02 tension of 0.6-1.05 mg per liter. (Knapp-USGS)
W74-09093

DEPOSITION OF DDE AND POLYCHLORINATED BIPHENYLS IN DATED SEDIMENTS OF THE SANTA BARBARA BASIN,
California Univ., Bodega Bay. Bodega Marine Lab.
W. Hom, R. W. Risebrough, A. Soutar, and D. R. Young.
Science, Vol 184, No 4142, p 1197-1199, June 14, 1974. 1 fig, 1 tab, 15 ref. NSF Grant GX-32885, NFS Grant GA-27306.

Descriptors: *Polychlorinated biphenyls, *DDE, *Bottom sediments, *California, *Path of pollutants, Radioactive dating, Sedimentation.
Identifiers: *Santa Barbara Basin(Calif).

In the Santa Barbara Basin of the Southern California Bight, deposition of polychlorinated biphenyls (PCB) began about 1945 and DDE first appeared about 1952. Concentrations of both show a progressive increase through 1967; estimated deposition rates (in grams per square meter per year) in 1967 of DDE and PCB were 0.00019 and 0.00012, respectively. (Knapp-USGS)
W74-09097

ACID RAIN: A SERIOUS REGIONAL ENVIRONMENTAL PROBLEM,
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
G. E. Likens, and F. H. Bormann.
Science, Vol 184, No 4142, p 1176-1179, June 14, 1974. 2 fig, 32 ref.

Descriptors: *Path of pollutants, *Precipitation(Atmospheric), *Acids, *Air pollution, Water pollution sources, Industrial wastes, Sulfates, Nitrates, Chlorides.
Identifiers: *Acid rain.

Acid rain and snow are falling on most of the northeastern United States. The annual acidity value averages about pH 4, but values between pH 2.1 and 5 have recorded for individual storms. The acidity of precipitation in this region apparently increased about 20 years ago, and the increase may have been associated with the augmented use of natural gas and with the installtion of particle-removal devices in tall smokestacks. (Knapp-USGS)
W74-09098

WATER QUALITY MODELS USING THE BOX-JENKINS METHOD,
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
P. M. Huck, and G. J. Farquhar.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE3, Paper 10629, p 733-752, June 1974. 9 fig, 7 tab, 13 ref, append.

Descriptors: *Time series analysis, *Path of pollutants, Water quality, *Statistical models, Water pollution, Chlorides, Dissolved oxygen, Model studies, Time series analysis.
Identifiers: *Box-Jenkins method.

The Box-Jenkins method, a time-based technique for time series analysis, is successful in modeling chloride and dissolved oxygen data for the St. Clair River near Corunna, Ontario. The technique is superior in the situation to either a frequency-based approach or a deterministic causative model. The model building process includes identification, estimation, and diagnostic checking stage. Forecasting and interpretation follow the derivation of successful models. An autoregressive type of model best represents the chloride data, and a moving average process represents the dissolved oxygen. Similar causative mechanisms appear to influence June and December chloride and June dissolved oxygen. (Knapp-USGS)
W74-09113

STOCHASTIC MODEL OF DYNAMIC EUTROPHIC ESTUARY,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
W. R. Schofield, and R. G. Krutchkoff.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE3, Paper 10578, p 613-628, June 1974. 1 fig, 2 tab, 23 ref, append.

Descriptors: *Estuaries, *Eutrophication, *Statistical models, *Path of pollutants, *Mathematical models, Stochastic processes, Water pollution, Potomac River, Model studies.
Identifiers: *Potomac estuary.

A stochastic model for a one-dimensional estuary was formulated. With the addition of a single new parameter, a stochastic model can be built from its deterministic counterpart. The derivation is sufficiently general to permit any number of components and any reasonable system configuration to be handled. All system parameters, conditions, and forcing functions could be continuous functions of time (not just tidal phase), position, and other factors. The Potomac estuary was modeled for the period January to October, 1969. Measured and predicted concentrations were compared in their means and in the distributions with good agreement. (Knapp-USGS)
W74-09114

THE TIDE OF INDUSTRIAL WASTE,
J. McCaull.
Environment, Vol 14, No 10, p 31-39, December 1972. 3 photo, 3 tab, 21 ref.

Descriptors: *Water pollution control, Contamination(Water), Pollution(Stream), Biochemical oxygen demand, Chemical wastes, *Industrial wastes, Wastes, *Water pollution sources, *Environmental effects, Waste treatment.

With the rise in industrial expansion, the country's streams and rivers are rapidly becoming more contaminated. Over a third of all pollution in United States streams is due to industry. Despite recycling and water purification programs, the net effect is still a further decline in water quality. Many segments of industry are turning to new materials or techniques to speed production at the cost of increased environmental degradation. The economy of the U.S. has been marked not only by a voracious absolute demand for more goods, but by a relative preference for goods whose production involves a substantial wasting of organic materials and water. In the immediate future there will be increased environmental pollution caused by organic chemical contamination. The major factor in this trend is the versatility of modern industrial chemistry, which is based on petroleum as a raw material. The costs of continued pollution must be weighed against the benefits of the technology causing it. Such an analysis must be applied to the decision process when considering the introduction of new technology, alternation of the old, and selection of alternatives if there is to

be a true balance between industrial and environmental demands. (Daniels-Florida)
W74-09119

DO NUCLEAR PLANTS MAKE DEADLY NEIGHBORS,
Washington Univ., St. Louis, Mo. Center for the Biology of Natural Systems.
For primary bibliographic entry see Field 5G.
W74-09123

PARTIAL AREA HYDROLOGY AND ITS APPLICATION TO WATER RESOURCES,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
For primary bibliographic entry see Field 2A.
W74-09200

CYCLING AND CONTROL OF METALS.
Available from NTIS, Springfield, Va 22151, as PB-216 184, price $6.00 printed copy; $1.45 microfiche. Proceedings of Environmental Resources Conference, October 31-November 2, 1972, Columbus, Ohio: Environmental Protection Agency National Environmental Research Center, February 1973. 187 p.

Descriptors: *Path of pollutants, *Trace elements, *Heavy metals, Lead, Zinc, Copper, Mercury, Iron, Asbestos, Beryllium, Industrial wastes, Mine wastes, Water pollution control, Monitoring.
Identifiers: Arsenic.

The problems of metals and their relationships to the environment were discussed in a conference held in 1973. The source of trace metals in the environment, their transport and effects, control processes, monitoring, and economic and legal aspects are among the topics discussed. (See W74-09207 thru W74-09217) (Knapp-USGS)
W74-09206

NATURAL SOURCES OF SOME TRACE ELEMENTS IN THE ENVIRONMENT,
Geological Survey, Washington, D.C.
M. Fleischer.
In: Cycling and Control of Metals; Proceedings of Environmental Resources Conference, October 31-November 2, 1972, Columbus Ohio: Environmental Protection Agency National Environmental Research Center, p 3-10, February 1973. 1 fig, 9 tab, 42 ref.

Descriptors: *Lead, *Cadmium, *Arsenic compounds, *Mercury, Water pollution sources, Industrial wastes, Weathering, *Trace elements, *Path of pollutants.

Natural sources of lead, cadmium, arsenic, and mercury in the environment are discussed. Particular attention is directed towards concentrations of these elements in natural materials whose present uses (coal, phosphorite, sedimentary iron ores) or possible future uses (oil shale) could cause environmental problems. More than 90% of the lead and cadmium discharged into the atmosphere and streams can be ascribed to manmade sources. The natural sources of arsenic, particularly the erosion of surface rocks, may account for a significant portion of its discharge to the atmosphere and streams. The very large amount of material involved, especially the emanations from mud volcanoes, indicates the proportion of mercury reaching the atmosphere and waters from natural sources must be high; possibly of the order of 30% to 70% of the total. Sediments of southeastern Lake Ontario show a spectacular increase of mercury from 1906 to the 1940's. In this industrialized area, man's activities supply about two-thirds of the mercury. (See also W74-09206) (Knapp-USGS)
W74-09207

THE LEAD INDUSTRY AS A SOURCE OF TRACE METALS IN THE ENVIRONMENT,
Missouri Univ., Rolla.
B. G. Wixson, E. Bolter, N. L. Gale, J. C. Jennett, and K. Purushothaman.
In: Cycling and Control of Metals; Proceedings of Environmental Resources Conference, October 31-November 2, 1972, Columbus, Ohio: Environmental Protection Agency National Environmental Research Center, p 11-19, February 1973. 7 fig, 16 ref.

Descriptors: *Water pollution sources, *Mining, *Lead, *Missouri, *Mine water, Mine drainage, Mine wastes, Spoil banks, Air pollution, Streams, Trace elements, Heavy metals, Industrial wastes.
Identifiers: *New Lead Belt(Mo).

In order to evaluate the effects of the developing lead mines in southeastern Missouri on water quality and aquatic ecosystems, an extensive sampling program was established. Twenty-one principal sampling sites were selected. Samples were analyzed for both heavy metals and organic parameters of pollution. Heavy metal concentrations in the streams, before the start of the mining activity and in the control streams following the start of the activity, were in the range of 1 to 20 parts per billion (ppb) for copper, lead, and zinc. Most of the values were in the 4 to 6 ppb range and the water pH ranged from 7.0 to 8.8. The results of lead analyses on selected stream sites, over a 1-year period, showed 22 separate unfiltered samples which were in excess of the 0.05 ppm limit set for drinking water. High values were invariably concomitant with storm runoff. Problems with zinc in effluents occur in two mining and milling effluent discharges. The heavy metal content of mine and mill discharge waters, in the New Lead Belt of Southeastern Missouri, could be sufficiently reduced in retention lagoons to permit discharge into streams. Transport of ore concentrate in open trucks or railroad cars, without coverage, contributes windblown trace metals into the environment. The air pollution problems created by smelting the sulfide-containing concentrates include sulfure dioxide derived from sinter machines, as well as dusts, and fumes containing lead and other heavy metals from the sintering operation. (See also W74-09206) (Knapp-USGS)
W74-09208

SOURCES OF TRACE METALS FROM HIGHLY-URBANIZED SOUTHERN CALIFORNIA TO THE ADJACENT MARINE ECOSYSTEM,
Southern California Coastal Water Research Project, Los Angeles.
D. R. Young, C-S. Young, and G. E. Hlavka.
In: Cycling and Control of Metals; Proceedings of Environmental Resources Conference, October 31-November 2, 1972, Columbus, Ohio: Environmental Protection Agency National Environmental Research Center, p 21-39, February 1973. 7 fig, 15 tab, 9 ref.

Descriptors: *Path of pollutants, *Water pollution sources, *Trace elements, *California, *Sea water, Coasts, Advection, Ocean currents, Lead, Cadmium, Iron, Zinc, Mercury, Copper, Nickel, Manganese, Chromium, Urban runoff, *Municipal wastes.

Approximately 1000 mgd of treated municipal wastewaters are discharged daily through marine outfalls to the Southern California Bight. Most of this, 84%, receives primary treatment only. Trace metals monitoring programs by the major dischargers were established prior to, or during, 1971. This has enabled a reliable estimate of trace metal mass emission rates from municipal wastewater discharges to the Bight of 1971. Of the estimated input routes of locally derived copper and mercury, municipal wastewater discharge, vessel antifouling paint, and direct rainfall all appear to have about the same importance. For zinc, municipal wastewater and direct rainfall appear to predominate. In the case of lead, the surface runoff input is the same order as that of municipal wastewaters, but these sources probably contribute an order of magnitude less lead to the waters of the Bight than does aerial fallout. Cobalt, iron, and manganese are the only other trace metals studied that have surface runoff inputs of approximately the same importance as those of municipal wastewaters, and the inputs of these metals via both modes may be more dependent on natural than anthropogenic sources. However, for silver, cadmium, chromium, and nickel, present data suggest that municipal wastewater discharge to the Bight dominate all other locally-derived inputs. With the exception of chromium, lead, and iron, for each of the trace metals studied the sum of all estimated yearly inputs eminating from the coastal plain of the Bight is one to two orders of magnitude below the estimated annual flux of the metal through the Bight via ocean current advection. (See also W74-09206) (Knapp-USGS)
W74-09209

PHYSICAL TRANSPORT OF TRACE METALS IN THE LAKE WASHINGTON WATERSHED,
Washington Univ., Seattle.
R. S. Barnes, and W. R. Schell.
In: Cycling and Control of Metals; Proceedings of Environmental Resources Conference, October 31-November 2, 1972, Columbus, Ohio: Environmental Protection Agency National Environmental Research Center, p 45-53, February 1973. 6 fig, 5 tab, 28 ref. EPA Grant No R-800357.

Descriptors: *Trace elements, *Path of pollutants, *Washington, Lakes, Lead, Mercury, Copper, Zinc, Sodium, Iron, Air pollution, Industrial wastes, Municipal wastes.
Identifiers: *Lake Washington(Wash).

In the drainage basin of Lake Washington, trace metal enrichment is correlated with the cultural development of the region. The trace elements are brought into the local hydrosphere principally by advective atmospheric transport. Fluvial processes are of considerable significance, but appear to be reflected in the sediments primarily on the basis of the suspended load. Trace metal analysis of recent lake sediments can provide meaningful data concerning the impact of man on his environment, and offers a unique opportunity for evaluating past environmental conditions. Based on the lake volume, fluvial output and sedimentary deposition, the following mean residence times were estimated: iron, 11 days; lead, 26 days; mercury, 15 months; copper, 16 months; zinc, 21 months; and sodium, 29 months. The mean residence time for the lake water is also 29 months. (See also W74-09206) (Knapp-USGS)
W74-09210

BIOLOGICAL UPTAKE AND DISTRIBUTION OF LEAD IN ANIMALS,
Illinois Univ., Urbana.
For primary bibliographic entry see Field 5C.
W74-09211

TRACE METALS IN EFFLUENTS FROM METALLURGICAL OPERATIONS,
Battelle Columbus Lab., Ohio.
For primary bibliographic entry see Field 5D.
W74-09212

POLLUTION ABATEMENT IN THE METAL FINISHING INDUSTRY,
Environmental Protection Agency, Edison, N.J.
For primary bibliographic entry see Field 5D.
W74-09213

CONTROL AND PREVENTION OF MINE DRAINAGE,
Environmental Protection Agency, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.

W74-09214

MONITORING FOR TRACE METALS--WATER ENVIRONMENT,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W74-09215

MONITORING OF SOLID WASTES,
Michigan Univ., Ann Arbor.
For primary bibliographic entry see Field 5A.
W74-09216

DIMENSIONS OF MONITORING,
MITRE Corp., McLean, Va.
For primary bibliographic entry see Field 7A.
W74-09217

EFFECT OF MINE DRAINAGE ON THE QUALITY OF STREAMS IN COLORADO, 1971-72,
Geological Survey, Lakewood, Colo.
D. A. Wentz.
Colorado Water Resources Circular No 21, 1974. 117 p, 9 fig, 3 plate, 12 tab, 93 ref, append.

Descriptors: *Acid mine water, *Mining, *Colorado, *Trace elements, Mine acids, *Iron, Heavy metals, Water temperature, *Sulfates, Copper, Zinc, Water pollution sources, Water pollution effects, Water quality, *Mine drainage.

Mine drainage in Colorado is commonly acid water containing high concentrations of iron and sulfate. The oxidation of metal sulfides under acid conditions releases high concentrations of trace elements to the water. Field observations of temperature, specific conductance, pH, stream-bottom conditions, and aquatic biota at 995 stream sites in Colorado during 1971-72 were used as a guide in collecting 192 samples for analysis of sulfate and dissolved trace elements. Approximately 450 miles of streams in 25 different areas are adversely affected by metal-mine drainage. Of the trace elements for which the U.S. Public Health Service has established drinking water standards, cadmium exceeds its limit in more than 12% of the samples, while arsenic and lead exceed their limits in 1-3% of the samples. Mercury and silver standards are not surpassed; chromium was not detected. Copper and zinc appear to present the greatest danger insofar as toxicity to resident aquatic life is concerned. Acid production is less of a problem in Colorado streams draining metal-mining areas than in streams draining the coal-mining areas of Appalachia. (Knapp-USGS)
W74-09228

PACIFIC NORTHWEST LABORATORY ANNUAL REPORT FOR 1973 TO THE USAEC DIVISION OF BIOMEDICAL AND ENVIRONMENTAL RESEARCH - PART 2, ECOLOGICAL SCIENCES,
Battelle-Pacific Northwest Lab., Richland, Wash.
Environmental and Life Sciences Div.
For primary bibliographic entry see Field 5C.
W74-09233

ENVIRONMENTAL CHEMISTRY,
Battelle-Pacific Northwest Lab., Richland, Wash.
Environmental and Life Sciences Div.
R. E. Wildung, T. R. Garland, H. Drucker, R. C. Routson, and B. Klepper.
In: Report No. BNWL-1850, Pt. 2, p 19-56, January 1974. 10 fig, 18 tab, 29 ref.

Descriptors: *Environment, *Chemistry, *Plutonium, Soils, *Absorption, *Chemical reactions, Plants, *Aquatic soils, Sediments, Marine plants, Marine animals, Radioactive waste disposal, Movement, Leaching, Radioecology, Ecosystems, Iodine, Suspended solids.

Reports studies of the potential for plutonium complexation in soil and uptake by plants, characteristics of Hanford soils and aquatic sediments, fate and effect of oil on marine coastal ecosystems, radioecology of iodine-129, and suspended particle interaction. The possibility exists that the chemical form of plutonium may be directly altered by the soil microflora, thereby increasing plutonium solubility in soil and uptake by plants. The fate of radionuclides in a broad range of surface soils is being studied. Suspended matter and sediments of the lower Columbia River Watershed is of current concern. The fate and effects of oil on marine coastal ecosystems are reported. Emphasis is given to the behavior of transuranium elements in soil-plant systems. Studies of iodine-129 include theoretical dose calculations, field studies of I-129 in the environment, and laboratory studies of iodine movement in soils and plants. Consideration is given to the environmental mobility of plutonium with respect to plant canopies to determine transfer coefficients. (See also W74-09233) (Houser-ORNL)
W74-09235

FRESHWATER ECOLOGY,
Battelle-Pacific Northwest Lab., Richland, Wash.
Environmental and Life Sciences Div.
For primary bibliographic entry see Field 5C.
W74-09236

MARINE SCIENCES,
Battelle-Pacific Northwest Lab., Richland, Wash.
Environmental and Life Sciences Div.
For primary bibliographic entry see Field 5C.
W74-09237

RADIOLOGICAL SCIENCES,
Battelle-Pacific Northwest Lab., Richland, Wash.
Environmental and Life Sciences Div.
For primary bibliographic entry see Field 5C.
W74-09238

TERRESTRIAL ECOLOGY,
Battelle-Pacific Northwest Lab., Richland, Wash.
Environmental and Life Sciences Div.
For primary bibliographic entry see Field 5C.
W74-09239

5C. Effects Of Pollution

THE RECOVERY OF STREAM MACROBENTHIC COMMUNITIES FROM THE EFFECTS OF ACID MINE DRAINAGE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
E. E. Herricks.
Available from the National Technical Information Service as PB-232 836; $18.50 in paper copy, $1.45 in microfiche. Ph D Dissertation June 1973. 279 p, 17 fig, 17 tab, 81 ref, 5 append. OWRR B-034-VA(4).

Descriptors: *Mine acids, *Mine drainage, *Water quality, Tributaries, Neutralization, *Pennsylvania, Water pollution control.
Identifiers: *Stream recovery, Macrobenthic communities, Recolonization, Indian Creek(Penn), Little Scrubgrass Creek(Penn).

The effects of short term low pH and long term acid mine drainage (AMD) stress were studied in relation to recovery and restoration of aquatic macrobenthic communities. Experimental acid additions were made to a healthy productive stream. Recovery was related to downstream drift of recolonizing organisms. A second study was made to observe drift born recolonizing organisms. Baetis sp. dominated drift collections and was most abundant in bottom fauna collections indicating a relationship between drift and section recovery. A two-year study was made on Indian Creek, Fayette Co., Pa. which received a major and several minor AMD discharges. Recovery was shown by density and diversity values similar to upstream reference stations. The addition of unpolluted tributary waters provided suitable habitat for recolonizing organisms and recovery occurred within 10 miles of the initial AMD discharges. Hydrologic and water quality models were also applied and developed. Estimated periods of high stream discharge correlated well with periods of high stream density and diversity in stream biota. Another study was made on Little Scrubgrass, Venango Co., Pa. to observe the effect of lime neutralization on the recovery process. Within 8 miles, water quality was restored downstream. Hydroxide floc, a by-product of AMD neutralization created a secondary stress at times.
W74-08701

PHOTOSYNTHESIS IN CELL DEVELOPMENT,
Maryland Univ., College Park. Dept. of Botany.
C. Sorokin.
Biochim. Biophy. Acta, Vol 94, No 1, p 42-52, 1965. (Illus).

Descriptors: *Algae, *Artificial media, *Testing, *Photosynthesis, *Cytological studies, Chlorophyta, *Chlorella, Metabolism, Water pollution effects.

Nonsynchronized suspensions of the green, high-temperature alga Chlorella 7-11-05 were subjected to fractional centrifugation, and two size groups of cells were separated. The small-cell fraction was presumed to consist largely of younger cells and the large-cell fraction predominantly of older cells. Manometric measurements in phosphate buffer at pH 4.5, in bicarbonate buffer at neutral pH, and in carbonate-bicarbonate buffer at pH 9.3 indicated that younger cells invariably possessed higher photosynthetic activity than older cells, provided the separation of cells into size fractions was reasonably good and the large cells were prevented from dividing during the process of separation. The superior activity of younger cells was ascertained at various light intensities and at different temperatures. Previous observations on the decline in photosynthetic activity with the age of synchronized cells were thus substantiated in the absence of a synchronizing agent, and the decline in photosynthetic capacity must be assumed to be characteristic of normal cell development. The decline in metabolic activity in the course of cell development is discussed in connection with metabolic turnover and is viewed as a demonstration of aging of cells.
W74-08713

USE OF DAPHNIA MAGNA FOR THE MICROBIO-ASSAY OF PESTICIDES, I. DEVELOPMENT OF STANDARDIZED TECHNIQUES FOR REARING DAPHNIA AND PREPARATION OF DOSAGE MORTALITY CURVES FOR PESTICIDES,
For primary bibliographic entry see Field 5A.
W74-08714

USE OF DAPHNIA MAGNA FOR THE MICROBIO-ASSAY OF PESTICIDES. II. COMPARISON OF MICROBIO-ASSAY WITH GAS CHROMATOGRAPHY FOR ANALYSIS OF PESTICIDE RESIDUES IN PLANT EXTRACTS,
For primary bibliographic entry see Field 5A.
W74-08715

ACCUMULATION OF DDT BY AQUATIC INDICATOR ORGANISMS,
Utah Univ., Ogden.
R. F. Gaufin.
Thesis, 1967. 230 p.

Descriptors: Degradation, *DDT, *Toxicity, *DDE, Water pollution effects, *Bioindicators, *Absorption, *Biomass.
Identifiers: Accumulation.

In laboratory and field studies on the accumulation of DDT by aquatic organisms, using both organisms with extensive previous exposure to DDT and those with no previous contact, the accumulation of DDT was related to the concentration of DDT in the water and increased with increases in concentration, in temperature, and in the solubility of the formulation used. The relative amounts of DDT accumulated tended to decrease with increase in biomass, and the rate of accumulation was affected by the composition of the biomass. The rates and mechanisms of accumulation for various species were related less to phylogenetic relations than to the degree of previous exposure of the population to DDT; samples from populations with a previous history of exposure could tolerate higher concentrations in the experiments and were more effective in accumulating, eliminating, and degrading DDT. Age and sex also had different effects on accumulation of DDT, which differed for different species. The method of uptake affected the residues found in the body; accumulation through the digestive system resulted in accumulation of large amounts of DDE, while accumulation through the exo-skeleton resulted in larger proportions of p,p'-DDT and o,p'-DDT. In view of the complex factors affecting the accumulation of DDT by aquatic organisms it is considered that no convenient scheme could be developed for the use of these organisms as indicators of pesticide contamination of surface waters.
W74-08716

RESPIRATION AND OSMOTIC BEHAVIOUR OF THE COPEPOD ACARTIA TONSA IN DILUTED SEA WATER,
Hull Univ. Dept. of Zoology. (England).
J. Lance.
Comparative Biochemical Physiology, Vol 14, No 3, p 155-165, 1965. (Illus.).

Descriptors: Physiology, *Salt tolerance, *Copepods, *Respiration, Plankton, *Osmotic pressure, Oxygen requirements, Water pollution effects.
Identifiers: *Acartia tonsa.

Adult females of the euryhaline planktonic copepod Acartia tonsa show increased oxygen requirements when the salinity of the surrounding sea water is lowered. The rise in respiration occurring during an 8-hr period of exposure to the diluted medium ranges from 0.077 ul oxygen/mg dry weight/hr at 90% sea water (0.7% increase) to 6.061 ul oxygen/mg/hr at the lowest salinity 30% sea water (101.4% increase). The increased metabolic rate can persist in diluted sea water for more than 24 hr. The internal osmotic concentration of copepods transferred from full-strength sea water to 50% sea water falls rapidly due to entry of water into the body. After 1 hr no further osmotic change can be detected.
W74-08717

THE EFFECT OF TEMPERATURE ON THE GROWTH AND SURVIVAL OF SEVEN MARINE ALGAL SPECIES,
Fish and Wildlife Service, Milford, Conn.
R. Ukeles.
Biological Bulletin, Vol 120, No 2, p 255-264, 1961.

Descriptors: *Algae, Temperature, *Cultures, Thermal pollution, *Marine algae, Phytoplankton, Water pollution effects, Growth, Inhibition, Chlorella.
Identifiers: *Algal growth.

The effect of temperatures ranging from 8 deg to 29 deg C on the growth of 17 species of marine phytoplankton has been investigated. Growth of all organisms tested took place between 18 deg and 22 deg C. There was no growth of the following organisms above 30 deg C: Monochrysis lutheri, Isochrysis galbana, Phaeodactylum tricornutum, Chlamydomonas sp., Chlorella sp. (UHMC), Protococcus sp. (T3), Nitzschia laevis, and Melosira sp. Multiplication at 30 deg C occurred in Dunaliella euchlora, Chlorella sp. (580), Chlorococcum sp., Platymona sp., Protococcus sp. (T9), Amphiprora sp., Actinocyclus sp. and Amphora sp. Survival at elevated temperatures is often dependent upon the time of exposure. The absence of growth at an elevated temperature may be due either to an inhibition that is reversible or to an irreversible heat death. At 8 deg C the rate of growth may be reduced or inhibited, but in no case was this low temperature lethal.
W74-08718

PHOSPHORUS CONTENT AND RATE OF GROWTH IN THE DIATOMS CYCLOTELLA NANA AND THALASSIOSIRA FLUVIATILIS,
New York State Dept. of Health, Albany. Div. of Labs., and Research.
G. W. Fuhs.
Journal of Phycology, Vol 5, No 4, p 312-321, 1969. (Illus).

Descriptors: *Algae, *Growth rates, *Chemostat, *Phosphorus, *Diatoms, Water pollution effects.
Identifiers: Turbidostat, *Cyclotella nana, *Thalassiosira fluviatilis.

Cyclotella nana and T. fluviatilis were grown in chemostat and turbidostat units in 1/3 strength artificial seawater supplemented with nutrients and vitamin B12 in excess except for P which in concentrations of 50 or 100 ug/liter was limiting. Different chemostat and turbidostat settings produced different cell numbers per unit volume which, since external P was practically nil, corresponded to varying amounts of bound P per cell. Growth rate plotted vs. P per cell follows a saturation curve. While no growth occurs at a certain minimum content of bound P, half the maximum growth rate is observed at twice the minimum level of P, 3/4 of the maximum at 3 times the minimum level, etc., the maximum growth rate being defined as that observed during growth unrestricted by P supply at a given set of conditions (light, temperature, salinity, etc.). Temperature and light were varied from 13.5 to 24 deg C and from 2000 to 6000 lux (continuous and intermittent). An abnormal growth curve was found with C. nana at 24 deg C and 6000 lux continuous light. Any change in P content of the cells significantly alters cell composition as reflected in P distribution in acid-soluble, lipid, and acid-insoluble fractions and in organic C content. External P does not immediately enter the equation for growth rate but is one of the factors determining rate of P uptake and therefore bound P per cell. Conditions governing uptake, however, cannot be adequately controlled in a chemostat and therefore should be determined in a different experimental approach. (See also W72-02718)
W74-08719

INFESTATION OF THE COPEPOD ACARTIA TONSA WITH THE STALKED CILIATE ZOOTHAMNIUM,
Lehigh Univ., Bethlehem, Pa. Dept. of Biology.
S. S. Herman.
Science, Vol 146 (3643), p 543-544, 1964. (Illus).

Descriptors: Ecology, *Symbiosis, *Protozoa, *Copepods, *Maryland, Water pollution effects, Animal parasites.
Identifiers: *Acartia tonsa, *Patuxent River(Md), Zoothamnium, Acartia clausi.

An entire population of the copepod Acartia tonsa in the Patuxent River, Maryland, was infested with a stalked protozoan of the genus Zoothamnium. Each copepod had 25 to 200 ciliates attached around the appendages. The infestation occurred at the time when Acartia tonsa was being replaced as the dominant copepod by Acartia clausi.
W74-08720

ON THE REARING OF COPEPODS IN THE LABORATORY, (SUR L'ELEVAGE DE COPEPODES AU LABORATOIRE),
Centre National de la Recherche Scientifique, Gif-sur-Yvette (France).
L. de Lepiney.
Hydrobiologia Vol 20, No 3, p 217-222, 1962.

Descriptors: *Copepods, Chlorella, Cultures, Water pollution effects.
Identifiers: *Rearing techniques, *Cyclops vicinus, Colpidium compylus, Paramecium caudatum.

The effects of rearing Cyclops vicinus in 5 different culture media are described. Using the best medium a further 7 spp. of copepod were reared and fed with Chlorella pyrenoidosa, Colpidium campylus or Paramecium caudatum.
W74-08721

SOME CHEMICAL CONSIDERATIONS IN THE DESIGN OF SYNTHETIC CULTURE MEDIA FOR MARINE ALGAE,
Marine Biological Station, Millport (Scotland).
M. R. Droop.
Bot Marine, Vol 2, Nos 3/4, p 231-246, 1961 (Illus).

Descriptors: *Algae, *Cultures, Chelaton, Iron, Hydrogen ion concentration, Salinity, *Metals, *Oxidation-reduction potential, Water pollution effects.
Identifiers: *Chelating agents, *EDTA, Citric acid.

The mode of action of chelating agents is discussed with reference first to iron, Eh and pH, then to the influence of salinity and chelating agent on the general equilibrium in mixtures of metals. Citric acid has distinct advantages over EDTA in marine media. Control of redox potential and of pH is discussed.
W74-08722

AN ALGAL MASS CULTURE UNIT FOR FEEDING MARINE INVERTEBRATE LARVAE,
Commonwealth Scientific and Industrial Research Organization, Crenulla (Australia). Div. of Fisheries and Oceanography.
B. Wisely, and C. Purday.
Australia Commonwealth Scientific and Industrial Research Organization, Division Fish. and Oceanogr. Technical Paper 12. 2-12, 1961 (Illus).

Descriptors: *Algae, *Cultures, *Aseptic conditions, *Temperature, *Growth rates, Water pollution effects, Chrysophyta, Invertebrates.
Identifiers: Isochrysis galbana, Dunaliella tertiolecta, Phaeodactylum tricornutum, Bacillariphta, Flagellates.

A unit is described which produces unialgal but not bacteria-free continuous or batch (400 l.) cultures. In three experiments at 19-20C the flagellate Isochrysis galbana Parke (Chrysophyceae) reached maximum densities of 2.0, 0.8, and 2.2 x 10 to the 6th power cells/ml in 37, 39, and 30 days of culture respectively. In three experiments at 19-20C the flagellate Dunaliella tertiolecta Butcher (Chlorophyceae) gave densities of 1.7, 1.9, and 2.2 x 10 to the 5th power cells/min in 13, 63, and 27 days. In five experiments at various temperatures the diatom Phaeodactylum tricornutum Bohlin (Bacillariophyceae) gave densities of 1.5, 2.3, 3.2, 3.2, and 6.0 x 10 to the 6th power cells/ml in 21 (27C), 11 (27C), 22 (23C), 22 (22C), and 26 (17C) days. In all experiments densities suitable for feeding larvae were obtained within 10 days.
W74-08723

SOME METHODICAL OBSERVATIONS ON THE USE OF ANTIBIOTICS FOR PREPARING BACTERIA-FREE ALGAL CULTURES,
Magyar Tudomanyos Akademia, Tihany. Biological Research Inst.
L. J. M. Felfoldy, and Z. F. Kalko.

Acta Biol Acad Sci Hungaricae, Vol 10, No 1, p 95-99, 1959.

Descriptors: *Algae, *Cultures, *Antibiotics, *Centrifugation, Water pollution effects, Bacteria.
Identifiers: *Aseptic condition, Organic agar media.

Bacteria-contaminated unialgal liquid cultures were passed through sterile medium by centrifugation and the centrifuged cells were allowed to stand in a sterile nutrient solution containing penicillin, streptomycin, aureomycin, and xanthracidine for 24 hours. Then the antibiotics were removed by repeated centrifugation and a large number of dilution cultures were made from each algal sample in Petri dishes containing peptone-yeast-glucose agar media. With this procedure, the ratio between algae and bacteria growing on the surface of the organic agar media was favorable.
W74-08724

SURVIVAL OF SOME PELAGIC COPEPODS OF THE BLACK AND MEDITERRANEAN SEAS IN WATER OF DIFFERENT SALINITY, (VYZHIVANIE NEKOTORYKH PELAGICHESKIKH KOPEPOD CHERNOGO I VREDIZEMNOGO MOREI V VODE RAZLICHNOI SOLENOSTI),
Institute of Biology of the Southern Seas, Sevastopo (USSR).
A. V. Kovalev.
Gidrobiol ZH, Vol 2, No 1, p 43-48, 1966 (Illus).

Descriptors: *Salt tolerance, *Copepods, Salinity, Water pollution effects.
Identifiers: *Acartia clausi, *Survival rates, Black Sea, Mediterranean sea.

The results are presented of experiments on the survival of certain species of pelagic Copepoda in water of varying salinity. The species surviving over a wide range of salinity were chiefly those that are common for both the Black and Mediterranean seas. Of the Black Sea Copepoda the greatest changes in salinity were tolerated by the 'small' Acartia clausi which inhabits bay, sounds and the coast of the Black Sea where there are sharp fluctuations in the salinity of the water. The Black Sea Copepoda -- with the exception of the 'large' A. clausi tolerated an increase in salinity better than a decrease. They have, apparently, retained some part of their previous saline spectrum.
W74-08725

EFFECTS OF COPEPOD GRAZING ON TWO NATURAL PHYTOPLANKTON POPULATIONS,
British Columbia Univ., Vancouver. Dept. of Zoology.
B. T. Hargrave, and G. H. Geen.
Journal of Fishery Research Board of Canada, Vol 27, No 8, p 1395-1403, 1970 (Illus).

Descriptors: *Grazing, *Algae, *Primary productivity, *Copepods, *Canada, Phytoplankton, Water pollution effects.
Identifiers: *Acartia, Nova Scotia(Cape Breton Island).

Feeding and filtration rates of 4 species of copepods (Pseudocalanus minutus, Temora longicornis, Oithona similis, and Acartia tonsa) from Bras d'Or Lake and Morrison's Pond, Cape Breton Island, Nova Scotia, were measured in the laboratory with natural populations of phytoplankton. Adult copepods ingested all sizes of flagellates (1-15 u in maximum dimension) but 5-15-u cells were removed most efficiently. Ceratium sp. and Chaetoceros sp., principal spring and winter forms, were not utilized. Feeding rate declined as the number of animals per liter and the duration of the experiment increased. Estimates of feeding rates in nature were derived by extrapolation from the results of laboratory experiments. A comparison of estimates of mean summer primary production at the depths of maximum photosynthesis and daily zooplankton food intake suggested that, at those depths, zooplankton in Bras d'Or Lake consumed all the average daily production whereas 66% was removed in Morrison's Pond. The remaining production in Morrison's Pond probably contributed to the support of large rotifer and ciliate populations not found in Bras d'Or Lake. Natural concentrations of flagellates were more than sufficient to meet copepod respiratory energy requirements under laboratory conditions.
W74-08726

AN INVESTIGATION OF THE COULTER COUNTER IN 'BIOMASS' DETERMINATIONS OF NATURAL FRESHWATER PHYTOPLANKTON POPULATIONS,
Royal Holloway Coll., Englefield Green (England).
For primary bibliographic entry see Field 5A.
W74-08727

MARINE PHYTOPLANKTON VARY IN THEIR RESPONSE TO CHLORINATED HYDROCARBONS,
Woods Hole Oceanographic Institution, Mass.
D. W. Menzel, J. Anderson, and A. Randtke.
Science, Vol 167,(3926), p 1724-1726, 1970 (Illus).

Descriptors: *Algae, *Toxicity, *Chlorinated hydrocarbons, *DDT, Phytoplankton, Water pollution effects, *Photosynthesis, Endin, Dieldrin, *Growth rates.
Identifiers: Skeletonema costatum, Cyclotella nana, Coceolithus huxlezi, Dunaliella tertiolecta.

Photosynthesis and growth in cultures of 4 marine phytoplankton species (Skeletonema costatum, Cyclotella nana, Coccolithus huxleyi, Dunaliella tertiolecta), isolated from different oceanic environments, were affected by 3 chlorinated hydrocarbons (DDT, dieldrin, and endrin) to varying extents. This ranged from complete insensitivity in Dunaliella to toxicity at concentrations of 0.1 to 1.0 part per billion of the pesticides in Cyclotella. Other forms were intermediate in their response.
W74-08728

MARINE PHYTOPLANKTON VARY IN THEIR RESPONSE TO CHLORINATED HYDROCARBONS,
Woods Hole Oceanographic Institution, Mass.
D. W. Menzel, J. Anderson, and A. Randtke.
Science, Vol 167, p 1724-1726, March 1970. 1 fig, 9 refs. (Contribution No 2424 from Woods Hole Oceanographic Institute). NSF Grant GB 15103, AEC Contract AT(30-1)-3862.

Descriptors: *DDT, *Chlorinated hydrocarbon pesticides, *Phytoplankton, Diatoms, Water pollution effects, Photosynthesis, Growth rates, Dieldrin, Endrin, Toxicity.
Identifiers: Skeletonoma costatum, Dunaliella tertiolecta, Coccolithus huxley, Cyclotella nana.

Photosynthesis and growth in cultures of four marine phytoplankton species (Skeletonema costatum), (Dunaliella tertiolecta), (Coccolithus huxley), and (Cyclotella nana) isolated from different oceanic environments, were affected by three chlorinated hydrocarbons (DDT, dieldrin, and endrin) to varying extents. This ranged from complete insensitivity in Dunaliella to toxicity at concentrations of 0.1 to 1.0 part per billion of the pesticides in Cyclotella. Other forms were intermediate in their response.
W74-08730

RESPONSES OF GYMNODINIUM BREVE DAVIS TO NATURAL WATERS OF DIVERSE ORIGIN,
Florida State Univ., Tallahassee. Dept. of Biological Science.
A. Collier, W. B. Wilson, and M. Borkowski.
Journal of Phycology, Vol 5, No 2, p 168-172, 1969.

Descriptors: *Algae, *Productivity, Water types, *Growth rates, Sulfides, Iron, Nitrogen, Phosphorus, Water pollution effects.
Identifiers: *Gymnodinium breve, EDTA.

The effect on the growth of Gymnodinium breve of river waters and seawater samples collected in different seasons and locations was investigated with and without differential enrichments. Growth in natural seawater was most clearly enhanced by addition of EDTA-Fe, sulfide, N and P. The seasonal variation in growth-promoting properties of seawater and river water dominates variations due to differences in location.
W74-08731

LIGHT QUALITY AND CONCENTRATION OF PROTEINS, RNA, DNA AND PHOTOSYNTHETIC PIGMENTS IN TWO SPECIES OF MARINE PLANKTON ALGAE,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Biological Sciences.
D. G. Wallen, and G. H. Geen.
Marine Biology, Vol 10, p 44-51, 1971.

Descriptors: *Marine algae, *Light quality, Physiology, *Chlorophyll, *Protein, Photosynthesis, Phytoplankton, Pigments.
Identifiers: *DNA, *RNA, *Cyclotella nana, *Dunaliella tertiolecta.

Chlorophyll, protein, DNA and RNA concentrations in cultures of Cyclotella nana (Hustedt) and Dunaliella tertiolecta (Butcher) were higher in blue light and lower in green light than in white light of the same intensity. Total carotenoid concentrations were highest in green light. Total pigment concentrations were highest in cells grown in blue light, lowest in those from green light. The relative changes in pigment concentrations associated with differences in spectral composition of the radiation are comparable to those often observed in phytoplankton from various depths in stratified natural water. Light adaptation in algae as a response to light quality is suggested. The chemical composition of plankton algae can be expected to vary considerably with depth.
W74-08736

LIGHT QUALITY IN RELATION TO GROWTH, PHOTOSYNTHETIC RATES AND CARBON METABOLISM IN TWO SPECIES OF MARINE PLANKTON ALGAE,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Biological Sciences.
D. G. Wallen, and G. H. Geen.
Marine Biology Vol 10, p 34-43, 1971.

Descriptors: *Marine, Algae, *Light quality, *Productivity, *Growth rates, Photosynthesis, Metabolism.
Identifiers: *Cyclotella nana, *Dunaliella tertiolecta.

The effect of light quality on growth, photosynthesis and carbon metabolism in two species of marine algae, Cyclotella nana (Hustedt) and Dunaliella tertiolecta (Butcher), was examined. Relative growth constants for C. nana were 0.37, 0.29 and 0.25 in blue, white and green light, respectively. Corresponding constants were 0.41, 0.31, and 0.29 for D. tertiolecta. Photosynthetic rates in both species were higher in blue light and lower in green light compared with white light of the same intensity. More than 60% of 14C assimilated by C. nana or D. tertiolecta grown in blue or green light was incorporated into the ethanol-insoluble fraction

compared with 10 to 30% in this fraction in white light. The relative importance of the various components within this fraction was independent of light quality. Although less 14C was assimilated into the ethanol-soluble fraction in blue or green light, there was a relative increase in some amino acids and organic acids in this fraction and a decrease in sugars and sugar phosphates relative to white light of the same intensity. These differences were independent of light intensity, photosynthetic rate and cell density in the cultures.
W74-08737

THE SALINITY TOLERANCE OF SOME ESTUARINE PLANKTONIC COPEPODS,
Hull Univ. (England). Dept. of Zoology.
J. Lance.
Limnology and Oceanography, Vol 8, p 440-449, 1963.

Descriptors: Salinity, *Copepods, *Temperature, *Salt tolerance, Estuarine environment, Water pollution effects.
Identifiers: *Acartia spp.

The salinity tolerance of three species of Acartia was investigated in the laboratory by recording the survival of female copepods at various salinities. The salinity tolerance of A. tonsa, A. discaudata, and A. bifilosa captured during the autumn, winter, and spring, respectively, depended on the temperature. Thermal prehistory of copepods affected their survival in diluted seawater, all species being most tolerant when the experiment and environmental temperature were close and least tolerant when the experimental and field temperatures differed markedly. The following order of salinity tolerance was established: A. tonsa, A. bifilosa, A. discaudata. Reinvestigation of the temperatures at which copepods had shown poorest survival in diluted seawater demonstrated that temperature acclimation increased salinity tolerance. The results imply that cooling of the environment might not necessarily lower the tolerance of the autumn, warmwater species, A. tonsa, provided that the change was gradual and that slow warming might not cause a decline in the tolerance of the spring, cold-water species, A. bifilosa. Salinity acclimation increased the salinity tolerance of A. bifilosa. The recovery of A. bifilosa in full-strength seawater after short exposure to low salinities depended on the length of exposure.
W74-08738

DECHLORINATION OF DDT BY AEROBACTER AEROGENES,
Bureau of Sport Fisheries and Wildlife, Denver, Colo. Fish-Pesticide Research Lab.
For primary bibliographic entry see Field 5B.
W74-08739

A CONTINUOUS RECIRCULATING CULTURE SYSTEM FOR PLANKTONIC COPEPODS,
National Marine Water Quality Lab., West Kingston, R.I.
E. J. Zillioux.
Marine Biology, Vol 4, No 3, p 215-218, November 1969.

Descriptors: *Plankton, *Copepods, Cultures, *Protozoa, Decomposing organic matter, Water pollution effects.
Identifiers: *Acartia spp., Euplotes vannus, Isochrysis galbana, Rhodomonas baltica, Flagellates.

The calanoid copepods, Acartia clausi Giesbrecht and Acartia tonsa Dana, are maintained at high densities in continuous culture at 15C. Synthetic sea-water medium is recirculated through filters and a foam tower which limits accumulation of dissolved wastes and various metabolites. The ciliate Euplotes vannus Muller is associated in culture with the copepods, and effectively controls bacterial population and accumulation of algal debris. The copepods graze upon the ciliates as well as upon the phytoflagellates Isochrysis galbana Parke and Rhodomonas baltica Korsten.
W74-08740

EXPERIMENTAL STUDY OF EGG-LAYING IN THREE NERITIC COPEPOD SPECIES (CENTROPAGES TYPICUS, ACARTIA CLAUSI, AND TEMORA STYLIFERA).
Centre d 'Oceanographie, Marseille (France). Station Marine d 'Endoume.
For primary bibliographic entry see Field 2L.
W74-08741

GROWTH RATES OF MARINE PHYTOPLANKTON: CORRELATION WITH LIGHT ABSORPTION BY CELL CHLOROPHYLL A.,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
R. W. Eppley, and P. R. Sloan.
Physiology Plant, Vol 19, No 1, p 47-59, 1966 (Illus).

Descriptors: *Growth rates, *Photosynthesis, Pigments, Cytological studies, *Chlorophyll, Phytoplankton, *Marine algae.
Identifiers: *Dunaliella tertiolecta.

Cellular contents of phytosynthetic pigments, cell volumes, cell surface areas and specific growth rate have been determined for batch cultures of 10 spp. of marine phytoplankton grown at a single constant light intensity and temperature. Similar data were obtained for Dunaliella tertiolecta at several light intensities and temperatures. The data were used to derive a model for predicting growth rate from a knowledge of temperature and light absorption by cell chlorophyll a. Growth rate was compared also with cell volume and surface area.
W74-08742

INFLUENCE OF SOME ENVIRONMENTAL FACTORS ON PRODUCTIVITY OF PLANKTONIC ALGAE IN CULTURE. (ETUDE DE L'INFLUENCE DE QUELQUES FACTEURS DE MILIEU SUR LA PRODUCTIVITE D'UNE ALGUE PLANCTONIQUE EN CULTURE).
Aix-Marseille Univ., Marseille (France). Faculte des Sciences.
S. Maestrini.
Rec. Trav. Sta. Mar. Endoume, Vol 57, No 41, p 33-108, 1966 (Illus.).

Descriptors: *Algae, *Cultures, *Growth rate, *Productivity, *Photosynthesis, Pigments, Carbon dioxide, Plant physiology, Water pollution effects.
Identifiers: Algal growth, Sulfactamide, Chloroamphenicol.

An elevation of light intensity from 1,000 to 7,200 lux is accompanied by more active growth and decreased pigment content in the Phaedactylum tricornutum cells. It is possible to eliminate the associated bacterial microflora with sulfacetamide and chloramphenicol, but this decreases algal growth. An atmosphere of air favors an increased rate of carbon assimilation, and an increase in the quantity of pigments produced. There is a decline in population density with increasing age of culture. This may be partly explained by the decrease in carbon dioxide concentration in the medium, but there may also be a change in the physiological state of the cells.
W74-08743

EXTRACELLULAR CARBOHYDRATE LIBERATION IN THE FLAGELLATES ISOCHRYSIS GALBANA AND PRYMNESIUM PARVUM,
Imperial Coll. of Science and Technology, London (England).
A. F. H. Marker.
Journal of Marine Biology Association, United Kingdom, Vol 45, No 3, p 755-772, 1965.

Descriptors: *Algae, Physiology, *Growth rates, Testing, *Carbohydrates, Cultures, Salinity, Nitrogen, *Productivity, Cytological studies.
Identifiers: Flagellates, *Isochrysis galbana, *Prymnesium parvum, Axenic cultures.

Extracellular carbohydrate liberation in I. galbana Parke and P. parvum N. Carter was studied in axenic culture in artifical sea water. Increased extracellular carbohydrate liberation occurred at both reduced and increased salinity and under conditions of N starvation in Isochrysis. Maximum production occurred during the early and later stages in growth falling to a minimum during the midgrowth phase. Greater extracellular carbohydrate production was found in Prymnesium. The cells did not appear to be damaged during harvesting. Hydrolysis of both extra- and intracellular carbohydrate yielded glucose, galactose, arabinose, xylose, and ribose. It is suggested that the presence of this extracellular carbohydrate is due to the passive release of organic matter from dead or dying cells.
W74-08745

THE PRODUCTION OF EXTRACELLULAR CARBOHYDRATES BY SOME MARINE FLAGELLATES,
Yale Univ., New Haven, Conn. Osborn Zoological Lab.
R. R. L. Guillard, and P. J. Wangersky.
Limnology and Oceanography, Vol 3, No 4, p 449-454, October, 1958.

Descriptors: *Algae, *Carbohydrates, *Productivity, Cytological studies, *Cultures.
Identifiers: *Flagellates(Marine), Isochrysis galbana, Monochrysis lutheri, Prymnesium parvum.

Extracellular carbohydrate production during the growth of bacteria-free cultures of the marine flagellates Isochrysis galbana, Monochrysis lutheri, Prymnesium parvum, Dunaliella euchlora, Pyraminomonas sp., Rhodomonas sp., and Chlamydomonas sp. was followed by the N-ethyl carbazole method. Carbohydrate production did not parallel cell numbers during exponential growth of any of these organisms: maximum concentrations during this phase were under 3 mg/L. Carbohydrates accumulated in all stationary cultures (having 1 million - 10 million cells/ml), to the greatest extent in Prymnesium cultures, which attained 123 mg/L. Isochrysis and Monochrysis produced 25 and 16 mg/L, respectively, while the others had under 10 mg/L even when cell disintegration was evident.
W74-08746

ECOSYSTEM OF THE SALTON SEA,
California State Univ., Long Beach. Dept. of Microbiology.
For primary bibliographic entry see Field 4A.
W74-08752

LIGHT AND TEMPERATURE RELATIONS IN A SMALL DESERT POND AS INFLUENCED BY PHYTOPLANKTONIC DENSITY VARIATIONS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
S. B. Idso, and J. M. Foster.
Water Resources Research, Vol 10, No 1, p 129-132, Feburary 1974, 5 fig, 8 ref.

Descriptors: *Phytoplankton, *Ponds, *Light, *Solar radiation, *Density, Temperature, Algae, Regime, Waste water(Pollution), Seepage, Water sampling, Chlorophyll, Water pollution effects.
Identifiers: Hygrothermograph, Thermocouples, Eppley pyronometer, Kipp solarimeter, Kemmerer-type water sampler bottle.

A significant relationship was observed in a small desert man-made pond between phytoplankton concentrations and concurrent light and temperature regimes. Measurements of solar radiation, air, and water, temperature were recorded at 4 different depths every half hour over a 3-month period. Chlorophyll a and b values were measured every few days to determine density variations in the phytoplanktonic community. The depth of penetration of solar radiation was mainly controlled throughout the summer months by the concentration of phytoplankton. The degree of light penetration in turn controlled the severity of temperature stratifications within the pond. During periods of algal blooms, a sequential cooling of lower layers and a warming of the surface layers occurred. This rise in surface temperatures during algal blooms was calculated to be sufficient to increase the daytime water-air vapor pressure difference about 25 percent, indicating that evaporation may be influenced by planktonic density variations. (Mastic-Arizona)
W74-08758

PHOSPHORUS AND CARBON IN LAKE POLLUTION,
Basf-Wyandotte Chemical Corp., Mich.
L. E. Kuentzel.
Environmental Letters, Vol 2, No 2, p 101-120, 1971. 41 ref.

Descriptors: *Algae, *Phosphorus, *Carbon, Carbon dioxide, *Lakes, Alkalinity, Algae control, Growth rates, Organic matter, Organic wastes, *Water pollution sources, Water pollution effects.

Recent laboratory and field tests and literature on the relationship between algae, phosphorus, and carbon in lake pollution are summarized. Algae can develop in waters containing only 10 ppb or less of phosphorus. Most natural waters have 10 ppb or more. Phosphorus is widespread in nature and widely used by man. Indications are that it will not be possible to reduce phosphorus to less than 10 ppm in urbanized areas by eliminating it from only detergents. It takes two pounds of carbon dioxide to grow one pound of algae. The amounts of carbon dioxide available from the atmosphere and the natural alkalinity of lake water are severely limited by physical and chemical laws. Algae growth depending solely on alkalinity and the atmosphere for carbon is relatively slow and limited by a rising pH at about 10. When adequate organic pollution is present, bacteria can undergo a massive population explosion, produce large amounts of carbon dioxide, and cause massive algae growths. The role of the organic matter becomes more evident in those cases where algae growth is massive in the presence of such pollution even though the phosphorus content of the water never exceeds 10 ppb. It appears that algae growth will be controlled only when organic pollution is controlled, regardless of the phosphorus content. (Merritt-FIRL)
W74-08775

OXYGEN UTILIZATION IN BACTERIAL-PROTOZOAN COMMUNITY,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
R. P. Canale, and F. Y. Cheng.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE1, p 171-185, February 1974. 10 fig, 1 tab, 14 ref.

Descriptors: *Biochemical oxygen demand, Investigations, Recycling, Organic matter, Water quality, *Protozoa, Nutrients, Cycling nutrients, Bacteria, *Mathematical studies, *Model studies, Metabolism, Water pollution effects.
Identifiers: *Aerobacter aerogenes, *Tetrahymena pyriforms.

The dynamic relation between oxygen utilization, nutrient consumption, and bacterium and protozoan growth in bath cultures was investigated with A. aerogenes and T. pyriforms. The results were interpreted with a mathematical model which incorporated the interactions of the bacterium and the protozoan as well as the effects of nutrient availability and oxygen utilization. The model has several unique aspects: nutrient recycling and refractory carbohydrate accumulation, protozoan bioenergetics, and protozoan cell size variability. The experimental and modeling results confirm the findings of Bhatla and Gaudy that the plateau observed in BOD tests is a slow bacterial respiration phase. It was shown that the second stage oxygen demand in heterotrophic bacterial protozoan communities is the result of protozoan metabolism. These findings should be useful for defining organic matter stabilization pathways in multicomponent ecological models and for water quality management. (Merritt-FIRL)
W74-08776

ASPECTS OF WATER POLLUTION IN FERTILISER INDUSTRY,
Central Public Health Engineering Research Inst., Nagpur (India).
G. J. Mohanrao, and P. V. R. Subrahmanyam.
Indian Journal of Environmental Health, Vol 15, No 4, p 271-282, October, 1973. 1 fig, 5 tab, 13 ref.

Descriptors: *Fertilizers, *Water pollution sources, Industries, Toxicity, Industrial water, Waste water(Pollution), Water pollution control, Ammonia, Fluorides, Phosphates, Nitrogen compounds, Arsenic compounds.
Identifiers: *India.

There has been a continuous growth in the fertilizer industry in India in recent years to meet the ever increasing demand. The processes of manufacturing different types of nitrogenous and phosphatic fertilizers are described briefly. The volume and characteristics of the waste water discharged from the industry are indicated. The waste waters contain a variety of pollutants which include ammonia, fluorides, arsenic, phosphate, and urea. Water pollution potential of different units in the fertilizer industry is discussed. The need for better process control for reduction of water pollution is stressed. (Sandoski-FIRL)
W74-08791

CELL WALL PROPERTIES OF COTTON ROOTS AS INFLUENCED BY CALCIUM AND SALINITY,
Texas A and M Univ. Weslaco. Agricultural Research and Extension Center.
For primary bibliographic entry see Field 3C.
W74-08808

COMPREHENSIVE MANAGEMENT OF PHOSPHORUS WATER POLLUTION,
Utah Water Research Lab., Logan.
Copy Available from GPO Sup Doc as EP1.23:600/5-74-010. $4.05; microfiche from NTIS as PB-232 958 $1.45. Environmental Protection Agency, Socioeconomic Studies Series Report EPA-600/5-74-010, February 1974. 411 p, 47 fig, 43 tab, 82 ref. EPA Program Element 1BA030, Contract 68-01-0728.

Descriptors: *Eutrophication, Nutrients, Primary productivity, *Phosphorus, Trophic level, Agriculture, Industry, Recreation, Water quality, Economics, Lakes, Taxes, Detergents, Waste water treatment, Water pollution control, *Lake Michigan, *Lake Erie, *Management.
Identifiers: Cost effectiveness, Regional management, *Mass flow model, Excise taxes.

The environmental problems of phosphorus pollution are examined using an activity analysis approach to account for phosphorus inputs to surface waters. For purposes of analysis, this study assumes phosphorus to be the limiting factor in algal growth and eutrophication. A mass flow model, general enough to be applied to specific lakes or river basins, was developed in order to relate the flow of phosphorus from all activities in a basin to the consequences of eutrophication. Various control tactics to limit mass flow and thus eutrophication were defined from the standpoint of both supply and demand for phosphorus producing products and the management of phosphorus uses. Combinations of feasible controls designated as strategies, were applied to the model to determine the cost-effectiveness of the strategies in minimizing eutrophication. A hypereutrophic hypothetical lake basin, Lake Michigan, and Lake Erie were analyzed as case examples to test the model and control methods. Overall strategies were derived for the hypothetical lake and then applied to Erie and Michigan. In simple terms, phosphorus management strategies seemed feasible for control of eutrophication in present-day Lake Michigan while waste treatment together with management strategies was necessary for Lake Erie. (EPA)
W74-08826

THE DEVELOPMENT OF PHOSPHATE FREE HEAVY DUTY DETERGENTS,
Gillette Co. Research Inst., Rockville, Md.
A. M. Schwartz, and S. E. Davis.
Copy Available from GPO Sup Doc as EP1.23:600/2-74-003, $2.65; microfiche from NTIS as PB-232 943, $1.45. Environmental Protection Agency, Technology Series, Report EPA-600/2-74-003, March 1974. 234 p, 49 fig, 29 tab, 102 ref. EPA Project 16080 FWE, Contract 14-12-875.

Descriptors: Economic Analysis, *Detergents, *Surfactants, Toxicity, Domestic wastes, Water Quality, Reviews, *Soaps, *Biodegradation, *Water Pollution effects.
Identifiers: *Phosphate-free detergents.

The purpose was to demonstrate state-of-the-art possibilities for producing phosphate-free household laundry detergents of satisfactory environmental and performance characteristics. The work involved formulation of several hundred experimental detergent compositions using different surfactant-builder combinations. These were tested for laundering performance, acceptability of physical form, biodegradability, aquatic toxicity, potential hazard in use, and growth stimulation of algae. Feasibility of economical production on an industrial scale was also considered. Some partially satisfactory formulations were found, and their shortcomings assessed with regard to performance and/or economic feasibility. These formulations coincide remarkably with formulations developed independently by industry. Further work with promising new builders and surfactant builder combinations is recommended, but only along environmental and health hazard lines. (EPA)
W74-08830

EARLY LIFE HISTORY AND FEEDING OF YOUNG MOUNTAIN WHITEFISH,
Utah State Univ., Logan. Dept. of Wildlife Science.
C. B. Stalnaker, and R. E. Gresswell.
Copy Available from GPO Sup Doc as EP1.23:660/3-73-019, $0.95; microfiche from NTIS as PB-232 992, $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-73-019, January 1974. 46 p, 18 fig, 13 tab, 1 ref. EPA Project 18050 DPL.

Descriptors: *Life history studies, *Spawning, *Water temperature, Fish behavior, *Fish food organisms, Fry, Aquatic habitats, Fish eggs, Thermal pollution, Morality, Hatching, *Utah, Water pollution effects.
Identifiers: *Mountain whitefish, *Culture methods, Fish growth, *Logan River(Utah).

Early life history studies and development of culture methods of the mountain whitefish

(Prosopium williamsoni) were conducted in the Logan River, and in the Utah State Research Laboratory and USU Fisheries Laboratory. Spawning was observed in the laboratory and in the Logan River from mid-November to mid-December during dusk. At ambient river temperature from 1.7-6.1 C eggs began hatching after 79 days and continued for 23 days. Total mortality to hatch of eggs from weekly collections from five areas was 92%. In the laboratory, at 7.2 C eggs began hatching in 52 days and continued for 23 days; at 8.9 C in 45 days and continued for 30 days. Larval whitefish from two areas showed differences in growth due to temperature experience. Growth was examined in the laboratory at 6, 9, and 12 C. A simple linear model for predicting growth was developed. Whitefish began feeding when 14-15 cm long, and fed near the bottom mainly on Chironomid larvae. Larval whitefish were raised at 2-14 C at 2 degree intervals, and were fed dry trout feed, Oregon Moist Pellets, mosquito larvae, and brine shrimp. Starved fish died earlier at higher temperatures; mortality ranged from 15% for 3 months on brine shrimp to 98% in 1.5 months on Oregon Moist Pellets. (Siefert-EPA)
W74-08832

POLLUTION EFFECTS ON ADULT STEELHEAD MIGRATION IN THE SNAKE RIVER,
Idaho Univ., Moscow. Coll. of Forestry.
C. M. Falter, and R. R. Ringe.
Copy Available from GPO Sup Doc as EP1.23:660/3-73-017, $1.50; microfiche from NTIS as PB-232 990 $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-73-017, February 1974. 101 p, 23 fig, 3 tab, 6 ref. EPA Project 18050 DMB.

Descriptors: *Rainbow trout, *Kraft mill effluent, Oxygen, Water pollution effects, *Migration behavior, Water temperature, Water velocity, Ultrasonic transmitters, Pre-impoundment water quality Anadromous fish, *Idaho, *Utah.
Identifiers: *Snake River(Idaho-Wash.), Lewiston(Idaho).

A three-year field study was conducted in 1969-1971 to assess the relationship of Kraft mill effluent and pre-impoundment water quality to adult steelhead trout (Salmo gairdneri Richardson) behavior in the Snake River, Idaho-Washington. Steelhead were tagged with ultrasonic tags and followed through a 25 km section of the proposed Lower Granite Reservoir. Limnological parameters were measured and compared with fish behavior. Mixing patterns of the Clearwater River with the Snake River were also assessed. Mean water quality changes in the Snake River as a result of pollution inputs in the study are very subtle. In terms of toxic affects from chemical loading, Snake River water quality is not greatly altered except in the immediate area of pollution input; steelhead avoidance of these localized problem areas, was not observed. No significant correlation could be made between any chemical water quality parameter and steel head behavior. However, as temperature dropped below 15 C fish movement slowed, fish generally stopped moving at night, and resting periods increased in length and number. Steelhead showed a preference to move in water with off-bottom current velocities of 0.2 to 0.5 m/sec and showed a definite pattern of crossover and resting points. (EPA)
W74-08833

EFFECTS OF TEMPERATURE ON DISEASES OF SALMONID FISHES,
Oregon State Univ., Corvallis. Dept. of Microbiology.
J. L. Fryer, and K. S. Pilcher.
Copy Available from GPO Sup Doc as EP1.23:660/3-73-020, $1.55; microfiche from NTIS as PB-232 988 $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-73-020, January 1974. 114 p, 8 fig, 20 tab, 6 ref. EPA Project 18050 DIJ.

Descriptors: Animal diseases, Effluents, *Fish diseases, Heated water, Infection, Microorganisms, Pathogenic bacteria, Pathology, *Thermal pollution, Water pollution, Water quality, Water temperature, Water pollution effects, *Salmon, *Trout, *Salmonids.

The effect of water temperature on infections of salmonid fish was investigated. Chondrococcus columnaris infection was studied in rainbow trout, coho and spring chinook salmon; Aeromonas salmonicida infection in coho and spring chinook salmon; and Aeromonas liquefaciens infection in steelhead trout. In all cases mortality rates were high at 64 F; moderate at 54 F; and low or zero at 39 to 49 F. Progress of the infections was accelerated at higher temperatures, and progressively retarded at decreasing temperature levels. In infection of coho with Ceratomyxa shasta, mortality was high at 69 F, low at 49 to 54, and zero at 39 to 44 F. This infection in rainbow trout resulted in high mortality at all temperatures except 39 degrees. In both cases the course of the disease was most rapid at higher temperatures, and became progressively slower as the temperature decreased. For infection of kokanee salmon fingerlings with sockeye salmon virus, the temperature range of 54 to 59 F was optimal. In this range mortality rates were high, and the course of the disease was most rapid. At higher temperatures mortality rates were lower, and at 39 to 44 F, progress of the disease was retarded, though total mortality was often high. (EPA)
W74-08834

THE ROLE OF ORGANIC DEBRIS AND ASSOCIATED MICRO-ORGANISMS IN PELAGIC ESTUARINE FOOD CHAINS,
Maryland Univ., Solomons. Natural Resources Inst.
D. R. Heinle, D. A. Flemer, J. F. Ustach, R. A. Murtagh, and R. P. Harris.
Available from the National Technical Information Service as PB-232 949 $4.75 in paper copy, $1.45 in microfiche. Maryland Water Resources Research Center, College Park, Technical Report No 22, (1973). 123 p, 12 fig, 11 tab, 45 ref. OWRR B-016-MD (1), 14-31-0001-3893.

Descriptors: *Marshes, *Detritus, *Copepods, Estuaries, *Food chains, *Maryland, *Productivity, Decomposing organic matter, Microorganisms, Primary productivity.
Identifiers: *Patuxent estuary(Md), *Marsh production, Eurytemora affinis, Scottolana canadensis.

Production on marshes adjacent to the upper Patuxent estuary was 1,000 to 1,500 grams dry weight per m2 per year. Approximately 6 to 9 percent of the annual production was exported to the estuary as particulate carbon. Production was comparable to other marsh systems but export (as percentage of production) was less, probably due to poor tidal exchange. In spite of the relatively low percentage of their fixed carbon contributed to the estuary, the marshes provide about one-third of the total carbon budget in the upper Patuxent. A large portion of the marsh carbon enters the estuarine system in early spring when levels of algal primary production are low. Substantial production of the calanoid copepod, Eurytemora affnis occurs with detrital carbon as the apparent food base. Feeding experiments indicate that E. affinis can reporduce when fed a diet of detritus enriched with bacteria and protozoa, or when fed only protozoa. Diets of detritus and micro-organisms alone were seldom equal to algal controls however, suggesting that detritus provides only part of the carbon requirement. A harpactacoid copepod, Scottolana canadensis, was found less capable of using detritus and associated microorganisms, but could obtain some energy from that source.
W74-08837

EFFECT OF INDUSTRIAL WASTES OF MEMPHIS AND SHELBY COUNTY ON PRIMARY PLANKTONIC PRODUCERS,
Christian Bros. Coll., Memphis, Tenn.
Robert Staub, John Appling, and Adrian M. Hofstetter.
Completion Report, October 1969, 31 p, 4 fig, 3 tab, 9 ref. OWRR Project B-004-TENN (1).

Descriptors: Correlation analysis, Iron, *Industrial wastes, Plankton, Turbidity, Chlorides, *Tennessee, Mississippi River, *Diatoms, *Primary productivity.
Identifiers: Diversity index, *Navicula, Nonconnah Creek(Tenn), Synedra, Wolf River(Tenn), *Memphis(Tenn).

Plankton analyses were used to study industrial waste pollution during 1968-69 at eleven stations on the Mississippi River and two Memphis tributaries: Wolf River drainage (north) and Nonconnah Creek (south). Correlation studies indicated that water temperature and chloride content correlated positively with total plankton (and diatom) counts; turbidity and iron content correlated negatively with these counts. Positive correlation was found between some counts and total hardness, pH, and silica content. The same general pattern appeared for centric and pennate diatoms and for the genera Navicula and Synedra. Possibility of an indicator for industrial waste pollution is confirmed by these results as well as by those of the second approach utilized: diversity index. Four classes of pollution in terms of ranges of diversity indices appeared: (1) heavy, with indices from 0.00 to 1.00; (2) moderate, from 1.00 to 2.00; (3) light, 2.00 to 3.00; and (4) slight to none, 3.00 to 4.50. Bar graphs giving magnitude of diversity indices for all samples helped in comparing degrees of pollution; e.g., one station with a heavy load of industrial waste effluent showed a significant difference in diversity index value from the same tributary upstream where little to no industrial wastes were present. (See also W70-10325)
W74-08840

NITROGEN: A PROBLEM OF DECREASING DILUTION,
Imperial Coll. of Science and Technology, London (England). Dept. of Mathematics.
For primary bibliographic entry see Field 5B.
W74-08864

VERTICAL DISTRIBUTION OF MICROBIAL PLANKTON IN SOUTHERN PART OF LAKE BAIKAL IN 1969, (IN RUSSIAN),
Biologo-Geograficheskii Nauchno-Issledovatelskii Institut, Irkutsk (USSR).
E. A. Maksimova, and V. N. Maksimov.
Mikrobiologiya. Vol 41, No 5, p 896-902, 1972. Illus. English summary.
Identifiers: Biomass, Lakes, Microbial studies, *Phyto-plankton, *USSR(Lake Baikal), *Vertical distribution.

Microbial plankton distribution in waters of the southern part of Lake Baikal (USSR) was studied for 1 yr. Two maxima of the microbial growth were confirmed: in the spring under ice (April) and in the summer (August-Sept.). The maxima are due to the growth phases of phytoplankton and to the water thermal properties. The biomass of microbial plankton was determined for the layer of 0-500 m. Microbial forms changed in the course of the year. The number of microbial cells during summer stagnation was higher than data obtained earlier by other authors; this can be interpreted as a result of human activity on the banks of Baikal and its tributaries.--Copyright 1973, Biological Abstracts, Inc.
W74-08870

BORON RELEASE FROM DEIONIZERS,
California Univ., Los Angeles. Dept. of Environmental Horticulture.
For primary bibliographic entry see Field 5B.

W74-08873

A FOSSIL PLANT ENVIRONMENTAL IMPACT STUDY,
Nebraska Public Power District, Columbus.
E. Sloth, and M. Locke.
Power Engineering, Vol 78, No 4, p 52-55, April, 1974. 5 fig.

Descriptors: *Fossil fuels, Sampling, Reservoirs, Measurement, Analysis, *Nebraska, Water districts.
Identifiers: *Environmental impact statements, *Power districts, *Sutherland reservoir(Neb).

The environmental impact study made by the Nebraska Public Power District for the proposed fossil fuel plant at Sutherland Reservoir is discussed. The studies are of much the same nature and scope as for a nuclear plant with a few exceptions: radioactivity measurement is deleted, and programs for baseline SO2 and particulate matter measurements and monitoring are instituted. A program of metering, sampling, counting, analyzing and logging has been underway about a year. It will be about 5 years before the plant goes into operation. During that time, the gathered data and deductions from it will indicate the relative vulnerability of various targets to various plant influences. The data will indicate sampling frequencies that should be increased or decreased, and it will disclose the presence of cyclical and irregular fluctuations in biota counts. (Merritt-FIRL)
W74-08874

SIGNIFICANCE OF ECOLOGICAL ANALYSES IN THE INTERPRETATION OF ENVIRONMENTAL RELEASES OF RADIONUCLIDES,
Oak Ridge National Lab., Tenn.
S. I. Auerbach, H. A. Vanderploeg, S. V. Kaye, and J. P. Witherspoon.
IEEE Transactions on Nuclear Science, Vol NS-21, No 1, p 18-22, February, 1974. 4 fig, 1 tab, 8 ref.

Descriptors: *Ecology, Analysis, *Radioisotopes, Aquatic environment, Cesium, Fishes, Potassium, Organic matter.
Identifiers: Oligotrophic waters, Eutrophic waters, Bioaccumulation factors.

The role of ecological analyses in the collection and interpretation of environmental measurements that are part of the surveillance programs of aquatic cosystems around nuclear facilities is discussed. Bioaccumulation factors are used to predict the radionuclide concentrations an organism accumulates from charonic releases. The bioaccumulation factor is the ratio of radionuclide concentration in the organism to that in water. Bioaccumulation factors range from less than 1 to greater than 100,000 depending on the element, organism, and the environmental and ecological factors. The bioaccumulation factors of cesium in fishes are illustrated as a function of potassium concentration in the water, feeding habits and eutrophy. The highest bioaccumulation factors are found in piscivorous fishes from oligotrophic waters, which are waters of low nutrient and organic content. Piscivorous fishes are expected to have the highest bioaccumulation factors because Cs concentration increases with trophic level. The generally lower bioaccumulation factors in eutrophic water may result from sorption of Cs to the more abundant particulate organic matter in these waters. Particulate organic matter strongly absorbs many radionuclides. (Merritt-FIRL)
W74-08878

DISTRIBUTION OF PHOSPHATES IN LAKE MARIUT, A HEAVILY POLLUTED LAKE IN EGYPT,
Alexandria Univ. (Egypt). Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W74-08881

CHLORINE RESIDUALS IN TREATED EFFLUENTS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
V. L. Snoeyink, and F. I. Markus.
Water and Sewage Works, Vol 121, No 4, p 35-38, April, 1974. 3 tab, 16 ref.

Descriptors: *Chlorine, *Toxicity, *Effluents, *Streams, Inlet, *Illinois, Chlorination, Reviews, Ammonia, Water pollution, Water pollution sources, Water pollution control, Activated carbon, Sulfur compounds, Investigations, *Waste water treatment.
Identifiers: Dechlorination, Sulfur dioxide.

Toxicity studies on chlorine residuals in treated effluents are reviewed and the results of a field survey are presented wherein the concentration and type of chlorine residual present in treated effluents were determined. Chlorine residuals in the concentration range of 1-5 mg/liter as C12 are being discharged to receiving waters in central Illinois as a result of chlorination of effluents for disinfection. The residual is predominantly monochloramine and in most instances it is being discharged to streams which provide little dilution. Other research has shown that chlorine residual imparts a definite toxicity to the discharge; stream criteria of 0.002 to 0.2 mg/liter total chlorine residual have been recommended depending on the type of fish to be protected in the receiving water and on whether the residual is continuously or intermittently present. Dechlorination can be achieved by use of sulfur compounds or by activated carbon. The carbon will also remove any ammonia. (Merritt-FIRL)
W74-08891

IMPACT OF BEACH NOURISHMENT ON DISTRIBUTION OF EMERITA TALPOIDA, THE COMMON MOLE CRAB,
Virginia Univ., Charlottesville.
B. Hayden, and R. Dolan.
Journal of the Waterways Harbors and Coastal Engineering Division, American Society of Civil Engineers Vol 100, No WW2, p 123-132, May, 1974. 7 fig, 1 tab, 10 ref.

Descriptors: *Crabs, *Ecological distribution, *Hydrogen sulfide, Beaches, Legal aspects, Sands, Currents, Wildlife management, *North Carolina.
Identifiers: *National Environmental Policy Act(1969), *Ecological impact, *Cape Hatteras(N.C.), Beach-nourishment, Emerita talpoida, Mole-crabs, Engineering projects.

Since the 1969 National Environmental Policy Act was passed, the determination of ecological impacts of engineering projects on such wildlife as the crab has become a practical and legal necessity. Emerita talpoida was studied at a Cape Hatteras, North Carolina beach-nourishment site. On the discharge of nourishment materials it was found: the sands are transported across and down the beach via swash and longshore currents; E. talpoida move down the beach, and result in increased densities at one location; at termination of discharge, recovery takes between three days and a week or two. Mole-crab population here experienced a migration rather than massive mortality. High hydrogen sulfide levels are postulated as cause for a temporary drop in population level. Redistribution of the population is the significant effect. (Prague-FIRL)
W74-08894

SALINITY-OZONE INTERACTIVE EFFECTS ON YIELD AND WATER RELATIONS OF PINTO BEAN,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
G. J. Hoffman, E. V. Maas, and S. L. Rawlins.
Journal of Environmental Quality, Vol 2, No 1, p 148-158, January-March, 1973. 4 fig, 2 tab, 16 ref.

Descriptors: *Salinity, *Air pollution effects, Air pollution, Plant growth, *Beans, Leaves, *Ozone, Oxidation, Osmotic pressure, Water pollution effects.
Identifiers: Pinto beans.

The interaction of salinity and ozone on the growth of pinto bean was evaluated in a controlled temperature light room. Salinity treatments having osmotic potentials of -0.4, -2.0, and -4.0 bars were studied in combination with 2-hour daily exposures to 0, 0.15, 0.25, and 0.35 ppm of ozone. Ozone at 0.15 ppm decreased the yield of nonsaline plants nearly 50%; and at 0.25 ppm and higher, no significant yield was obtained. The results were essentially the same for plants salinized to -2.0 bars. At -4.0 bars, the yield at 0.25 ppm was only reduced to half that of the ozone-free treatment. The results indicate no interaction between salinity and ozone below 0.15 ppm. Above 0.15 ppm, however, there is a large interaction. At salinities of -0.4 and -2.0 bars, water-use efficiency decreased as ozone increased. Ozone did not appear to influence leaf water potential or its components. (Skogerboe-Colorado State)
W74-08922

A STUDY OF THE EUTROPHICATION OF THE SURFACE WATERS OF PYRAMID LAKE,
Nevada Univ., Reno. Dept. of Chemical and Metallurgical Engineering.
J. L. Hendrix, and M. F. Deguire.
Available from the National Technical Information Service as PB-232 998: $3.00 in paper copy, $1.45 in microfiche. Completion Report, November 1973. 18 p, 1 fig, 4 tab, 17 ref. OWRR A-047-NEV(1). 14-31-0001-3828.

Descriptors: *Eutrophication, Surface waters, Brackish water, Water pollution effects, *Nevada, Algae, Phosphates, *Cyanophyta, *Light intensity, Growth rates, Anabaena, Water quality.
Identifiers: *Pyramid Lake(Nev), *Algal growth, *Nodularia spumigena, Chemostats.

The capacity of the Pyramid Lake, Nevada, environment to grow algae was studied. Pyramid Lake is a brackish terminal located in the Intermontane region. To understand the uniqueness of the lake's environment, both field and laboratory investigations were necessary. From field studies, the water quality, the pH of the lake, and the temperatures of the lake were obtained during the algal bloom in the summers of 1972 and 1973. By using phosphate concentration as the criteria, the lake could be classified as eutrophic. The main contributor to the bloom was the blue-green algae, Nodularia spumigena. Nodularia spumigena was isolated and cultured in the laboratory. Using the purified stock as inoculant, work using chemostats was conducted. In the fermentors, it has been determined that N. spumigena is sensitive to the light intensity. Light intensities of 100 foot candles for twelve hours per day cause the cell to bleach and then die. Actually, growth in the chemostats occurred only when the intensity was reduced to 35 foot candles. At that intensity the cells remained green and healthy looking. It was also determined that Nodularia spumigena can grow under diverse water qualities and strains of Anabaena can grow in the Pyramid Lake environment.
W74-08938

THE NUCLEAR FUEL CYCLE -- A SURVEY OF THE PUBLIC HEALTH, ENVIRONMENTAL AND NATIONAL SECURITY EFFECTS OF NUCLEAR POWER,
Union of Concerned Scientists, Cambridge, Mass.
D. F. Ford, T. C. Hollocher, H. W. Kendall, J. J. MacKenzie, and L. Scheinman.
Available: Union of Concerned Scientists, P.O. Box 289, MIT Branch Station, Cambridge, Mass. 02139. $6/copy. October 1973. 212 p, 5 fig, 21 tab, 129 ref, 3 append.

Descriptors: *Nuclear powerplants, Fuels, Cycles, *Radioactive waste disposal, Effluents, Regulation, Safety, *Uranium, Transportation, Mining, Waste storage, Hazards, Biology, *Public health, Population, Food chains, Tritium, Krypton radioisotopes, *Reviews, Environmental effects.
Identifiers: *Plutonium.

The report comprises reviews of the milling of uranium and the subsequent disposal of radioactive tailings, the storage and disposal of high level radioactive wastes, the exposure of uranium miners to radioactive gas, problems of diversion during routine transport of nuclear material for terrorist purposes, and some of the operating history of the first United States fuel reprocessing plant. In addition, a brief survey of the earlier and extensive UCS analyses of catastrophic nuclear power plant accidents is included. (See W74-08948 thru W74-08953) (Houser-ORNL)
W74-08947

STORAGE AND DISPOSAL OF HIGH LEVEL WASTES,
Brandeis Univ., Waltham, Mass. Dept. of Biochemistry.
T. C. Hollocher.
In: The Nuclear Fuel Cycle -- A Survey of the Public Health, Environmental and National Security Effects of Nuclear Power. p 8-55, October 1973. 3 fig, 3 tab, 28 ref, 2 append.

Descriptors: *Nuclear powerplants, *Effluents, Radioactive waste disposal, *Air pollution, Water pollution, *Soil contamination, Environmental effect, Fuels, Hazards, Safety, Evaluation, Assessment, Waste storage, Corrosion, Leakage, Research and development.
Identifiers: Fuel reprocessing.

Proposals for long-term storage or disposal of high-level waste from the nuclear power industry largely lie at the research and development stage. The proposals so far considered seriously by the AEC for the disposal of wastes are dubious in concept, not technically feasible, or they are so dependent upon site specific geological characteristics that suitability cannot be determined a priori without extensive on-site investigation. The impression is inescapable, in view of the present imprecise state of affairs, that no convincing statements exist regarding the long-term environmental impact attending the storage and/or disposal of wastes from fuel reprocessing. It is disturbing in this regard that the pace of development of a suitable waste disposal technology does not seem commensurate with the rate of expansion of the nuclear power industry. (See also W74-08947) (Houser-ORNL)
W74-08948

THE NUCLEAR SAFEGUARDS PROBLEM,
Cornell Univ., Ithaca, N.Y. Peace Studies Program.
J. Scheinman.
In: The Nuclear Fuel Cycle -- A Survey of the Public Health, Environmental and National Security Effects of Nuclear Power, p 56-74, October 1973.

Descriptors: *Nuclear energy, *Radioactivity, Safety factors, *Public health, *Transportation, Cites, Reasonable use, Economics, Cost-benefit theory, Regulation, Air pollution, Water pollution, Soil contamination, Disasters, Uranium, Plutonium.
Identifiers: Safeguards, Non-proliferation treaty, National security, Sabotage.

Nuclear power presents an added dimension to the issue of public health and security that arises from the fact that the same nuclear material that is capable of providing light for a city's thoroughfares, buildings, and residences is, when fabricated correctly and employed as a weapon, also capable of obliterating that city and its inhabitants. The task of insuring that such use, or the threat of such use, shall never occur is referred to as the nuclear safeguards problem. It is a subject of international scope. One major problem of the U.S. today is diversion from peaceful uses or theft. Nuclear safeguards in transportation ranks equally high. (See also W74-08947) (Houser-ORNL)
W74-08949

CATASTROPHIC NUCLEAR ACCIDENTS,
Union of Concerned Scientists, Cambridge, Mass.
D. F. Ford, and H. W. Kendall.
In: The Nuclear Fuel Cycle -- A Survey of the Public Health, Environmental and National Security Effects of Nuclear Power, p 75-91, October 1973. 16 ref.

Descriptors: *Accidents, *Hazards, *Safety, *Assessment, Regulation, Evaluation, Fuels, Nuclear powerplants, Public health, Safety factors, Toxicity, Administrative agencies, Federal government, Legal aspects.
Identifiers: *Nuclear fuel cycle, *Catastrophic accident.

The emergency core cooling system (ECCS) is a matter of national controversy. The matters discussed at the ECCS hearing were highly technical and of great volume. It is not possible to summarize the technical arguments and positions in a satisfactory manner. However, a brief, largely non-technical summary is presented of these important matters drawing on the ECCS hearing record, several UCS analyses, and other sources. (See also W74-08947) (Houser-ORNL)
W74-08950

RADIATION HAZARDS FROM THE MISUSE OF URANIUM MILL TAILINGS,
Brandeis Univ., Waltham, Mass. Dept. of Biochemistry.
T. C. Hollocher, and J. J. MacKenzie.
In: The Nuclear Fuel Cycle -- A Survey of the Public Health, Environmental and National Security Effects, p 92-115, October 1973. 2 tab, 14 ref, append.

Descriptors: *Uranium, *Radium, Environmental effects, Air pollution, Water pollution, Toxicity, Public health, *Mining, Mills, Mine wastes, Construction material, *Radioactivity, Regulation, X-rays, Gases, Administrative agencies, *Radioisotopes.
Identifiers: Population exposure.

The extraction of uranium from ore results in a sand-like material, called tailings, which still contains most of the original radium, and in some fluids and slimes which also contain radium. Prior to 1959 the disposal and handling of these materials caused the pollution of streams and water supplies by radium in the Southwestern United States. Prior to 1966 uranium tailings were used as fill and for other construction purposes around buildings. Some 3300 buildings have been discovered to be associated with tailings in and around Grand Junction (Mesa County) Colorado, some 5,000 buildings in the whole of Colorado, and perhaps 7,000-8,000 buildings altogether in the United States. The tailings emit alpha-rays and radon gas which expose persons indoors. In view of the situation described above and in anticipation of the milling of uranium ore which is soon to begin for the nuclear power industry, recommendations are made to alleviate the exposure. (See also W74-08947) (Houser-ORNL)
W74-08951

LUNG CANCER AMONG URANIUM MINE WORKERS,
Brandeis Univ., Waltham, Mass. Environmental Studies Program.
A. S. Schurgin, and T. C. Hollocher.
In: The Nuclear Fuel Cycle -- A Survey of the Public Health, Environmental and National Security Effects of Nuclear Power, p 116-148, October 1973. 1 fig, 4 tab, 41 ref.

Descriptors: *Mining, *Uranium, Human population, Human pathology, Epidemiology, Public health, Air pollution, Water pollution, Toxicity, Morbidity, Mortality, *Air pollution effects, Environmental effects.
Identifiers: Occupational exposure, Inhalation, *Lung cancer.

Large scale mining of uranium for atomic weapons began in Southwestern U.S. in 1946 following the passage of the Atomic Energy Act, and continued through about 1968 when the existence of adequate stockpiles of uranium led to a reduction in mining activities. During this period, and especially from 1946-1960, some 6,000 underground miners were significantly and needlessly exposed to radioactive gases present in the air of uranium mines. After analysis of the foregoing, recommendations are made to help protect the health and lives of present underground uranium miners. (See also W74-08947) (Houser-ORNL)
W74-08952

NUCLEAR FUEL REPROCESSING: RADIOLOGICAL IMPACT OF WEST VALLEY PLANT.
In: The Nuclear Fuel Cycle -- A Survey of the Public Health, Environmental and National Security Effects of Nuclear Power, p 149-207, October 1973. 1 fig, 10 tab, 27 ref.

Descriptors: *Fuels, *Nuclear powerplants, *Effluents, *New York, *Environmental effects, *Radioactivity, Waste treatment, Sites, Population, Density, Uranium, Plutonium, Liquid wastes, Monitoring, Water pollution, Streams, Fish, Standards, Sediments, Tritium, Public health, Iodine, Krypton, Strontium, Cesium.
Identifiers: Fuel reprocessing plant, *West Valley(N.Y.), Deer.

The operations of the Nuclear Fuel Services (NFS) reprocessing plant, located in West Valley, New York, are described and its radiological impacts on its surroundings for its first five years of operation are reviewed. The radioactive releases to the air and water from the plant during the period 1966-1971 were significant enough for the AEC and the State of New York to have required major modifications. As a result of the installation of a low level waste treatment facility, some of the liquid radioactive emissions, since 1971, have been reduced. Nevertheless, the future plant capacity at NFS will eventually increase by a factor of 15 over 1971 throughput. Also, most of the fuel reprocessed at NFS to date has been cooled for much longer than the 150 days minimum required by the NFS license, suggesting that future emissions may be greater as cooling periods are shortened. Recommendations based on the analysis of the plant's past and present operations are given. (See also W74-08947) (Houser-ORNL)
W74-08953

ENVIRONMENTAL ASPECTS OF PLUTONIUM -- A SELECTED, ANNOTATED BIBLIOGRAPHY.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-08957

ENVIRONMENTAL ASPECTS OF PLUTONIUM AND OTHER ELEMENTS - A SELECTED ANNOTATED BIBLIOGRAPHY.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-08958

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED HOPE CREEK GENERATING STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
Aval: NTIS, Springfield, Va., as Rept. No. Docket 50354-100; $10.60/copy, $1.45/microfiche. Report No. Docket 50354-100 and 50355-100, February 1974. 359 p, 30 fig, 47 tab, 141 ref, 3 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *New Jersey.
Identifiers: *Boiling water reactors, Artificial Island, *Delaware River, *Environmental impact statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed issuance of a construction permit for the Hope Creek Generating Station Units 1 and 2. The station is located in the state of New Jersey, on Artificial Island and will consist of two boiling-water reactors. Waste heat will dissipate into the atmosphere by a natural-draft cooling tower and blowdown water from the towers will be diluted with water withdrawn from and discharged to the Delaware River. Environmental impacts are assessed and after consideration of alternatives, an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion was to issue a construction permit for the facility subject to the following limitations: (1) additional study of proposed chlorination methods; (2) complete a preoperational ecological monitoring program; (3) obtain a water allocation waiving Tocks Island reservoir, and ensure compensating water storage capacity; (4) do certain redesign if necessary to protect aquatic ecosystems; (5) monitor for salt deposition; and (6) continuous efforts to guard against irreversible damage in plant construction and operation. (Houser-ORNL)
W74-08959

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF ST. LUCIE PLANT, UNIT 2.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Report No. Docket 50389-69; $7.60 per copy, $1.45 microfiche. Report No. Docket 50389-69, May 1974. 301 p, 48 fig, 39 tab, 104 ref, 4 append.

Descriptors: *Atlantic Ocean, *Nuclear powerplants, Effluents, Environment, Administrative agencies, Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Florida.
Identifiers: *Pressurized water reactors, *St. Lucie(Fla), *Environmental impact statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed construction of the St. Lucie Plant, Unit 2. The plant is located on Hutchinson Island on the east coast of Florida approximately midway between the cities of Fort Pierce and Stuart and will employ a pressurized water reactor cooled by water pumped from and discharged to the Atlantic Ocean. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary are compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to issue a construction permit for the plant subject to stipulated conditions for the protection of the environment. These conditions concern screening to minimize sky shine, replanting of dune, minimize adverse effects of construction by analysis of the problem and submission of a plan of action to eliminate or reduce harmful effects. (Houser-ORNL)
W74-08961

PROTOCOL FOR EVALUATING THE NITROGEN STATUS OF LAKE SEDIMENTS,
Wisconsin Univ., Madison. Dept. of Soil Science.
D. R. Keeney.
Copy Available from GPO Sup Doc as EP1.23:660/3-73-024, $0.65; microfiche from NTIS as PB-233 138 $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-73-024, February 1974. 25 p, 2 fig, 35 ref. EPA Project 16010 EHR Grant R-801362.

Descriptors: *Lakes, *Lake sediments, *Water chemistry, *Eutrophication, *Nitrogen, Nitrification, Denitrification, Mineralization, Nitrogen fixation, *Wisconsin.
Identifiers: Lake rehabilitation, Lake survey, Nitrogen sinks, Immoblization.

The approach and methodology to evaluate the nitrogen status of lake sediments, with the ultimate aim of estimating their role as a nitrogen source or sink to the overlying waters, is outlined. The information is derived from five years of research effort on the forms, amounts and transformations of nitrogen in lake sediments. The suggested approach involves monitoring or comparative characterization, or both, of the forms of nitrogen in lake sediments, along with laboratory tests to assess the relative rates of various key nitrogen processes such as nitrification, denitrification, mineralization and immobilization. (EPA)
W74-09065

DAILY VERTICAL DISTRIBUTION OF WINTER ZOOPLANKTON IN THE PELAGIC ZONE OF LAKE BAIKAL, (IN RUSSIAN),
Kaliningradskii Teckhnicheskii Institut Rybnoi Promyshlennosti i Khozyaistva (USSR).
M. B. Eggert.
Gidrobiol Zh. Vol 9 No 1 p 36-46, 1973. Illus. (English summary).
Identifiers: Copepods, Distribution patterns(Vertical), *Infusoria, Lakes, Larvae, Nauplius, *Pelagic zone, Phyto-plankton, Rotifers, *USSR(Lake Baikal), *Zooplankton.

There was a considerable predominance of infusoria among zooplankton. Daily vertical migrations of major species of rotifers and copepods were studied in connection with illumination conditions and distribution of fodder organisms (phytoplankton, nauplius larvae, etc.).--Copyright 1973, Biological Abstracts, Inc.
W74-09074

STOCHASTIC MODEL OF DYNAMIC EUTROPHIC ESTUARY,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
For primary bibliographic entry see Field 5B.
W74-09114

EFFECT OF ENVIRONMENTAL FACTORS ON LAKE ZOOBENTHOS IN THE SOUTHERN PART OF WESTERN SIBERIA (IN RUSSIAN),
Novosibirsk Siberian Research Inst. of the Fish Industry (USSR).
L. A. Blagovidova.
Gidrobiol Zh, Vol 9, No 1, p 55-61, 1973. English summary.
Identifiers: *Benthos, Biomass, Chironomids, *Environmental effects, Fish, Lakes, Larvae, Leech, Mineralization, Mollusks, Production, *USSR(Siberia), *Zoobenthos, Aquatic insects

Data obtained from investigation of 20 lakes in the forest-steppe and steppe regions of Western Siberia (USSR) and data from the literature for 1920-1930 showed that a long period with lack of water in many lakes resulted in a considerably decreased water level, increased mineralization and decreased specific composition and biomass of the benthos (Mollusks, chironomids, leeches, insect larvae), with decreased fish production. Benthos biomass did not change in lakes with stable level conditions. Reclamative measures are suggested to maintain stable water conditions.--Copyright 1973, Biological Abstracts, Inc.
W74-09120

BIOCOENOSES OF THE PALUSTRINE BODIES OF WATER OF THE SOUTHERN PART OF THE LAKE ONEGA-WHITE SEA WATERSHED, (IN RUSSIAN),
N. A. Belousova, and Z. I. Filimonova.
Ekologiya, Vol 4, No 1, p 32-35, 1973.
Identifiers: *Biocenoses, Lakes, Palustrine environment, Aquatic animals, Watersheds(Basins), *USSR(Lake Onega-White Sea), Aquatic plants, *Marshes, *Swamps.

The biocoenoses of small bodies of water in swamps differing in trophicity in the southern part of the Lake Onega-White Sea watershed (Karelia, USSR) were studied. The swamp expanses, bodies of water located on them, and the geobotanic and faunistic characteristics of the latter are described. The species composition for the aquatic fauna, also the numerosity of the leading groups and individual components are presented. The character and degree of development of the microfauna depend on the development of the hydrographic network in the swamps from the time of formation of the body of water and its overgrowth. The qualitative composition of the aquatic fauna can serve as one of the factors determining the history of formation of a swamp.--Copyright 1973, Biological Abstracts, Inc.
W74-09127

BENTHOS IN ARAKUM BODIES OF WATER (IN RUSSIAN),
Kaspiiskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Makhachkala (USSR).
M. K. Guseinov.
Gidrobiol Zh. Vol 9, No 2, p 80-86, 1973. Illus. English summary.
Identifiers: *Benthos, Productivity, *Seasonal, *USSR, Terek River, Aquatic animals, *Biomass, Estuarine environment.

Arakum (USSR) water bodies, situated within the estuarine part of the Terek river, showed fair stability of benthos species composition, its biomass and seasonal dynamics for the last 3 yr (1967-1969). It is suggested that bottom fauna formation stabilized in 1967, the third year of the water bodies existence. The low level of productivity depends on the lack of organic detritis content.--Copyright 1973, Biological Abstracts, Inc.
W74-09142

FORMATION OF GAS CONDITIONS IN THE VILYUI RESERVOIR, (IN RUSSIAN),
Akademiya Nauk SSSR. Yakutsk. Institut Biologii.
T. M. Labutina.

Gidrobiol Zh. Vol 9, No 1, p 16-22. 1973. Illus. English summary).
Identifiers: *Anaerobic conditions, Carbon, Dioxide, Distribution patterns, *Gas conditions, Organic matter, Reservoirs, Seasonal, Stratification, *USSR(Vilyui reservoir), Dissolved oxygen.

Data are presented on the content and seasonal distribution of O2 dissolved in water and free CO2 over the aquatorium of the Vilyui reservoir (USSR) in the period of the reservoir formation. The reservoir is situated in the region of permafrozen soils (Western Yakutia). Essential changes in gas conditions and well pronounced vertical stratification of gas are observed. A slight flowage of the reservoir and the presence of a great quantity of flooded organic remains caused origin of large areas with anaerobic zones.--Copyright 1973, Biological Abstracts, Inc.
W74-09162

BIOLOGICAL UPTAKE AND DISTRIBUTION OF LEAD IN ANIMALS,
Illinois Univ., Urbana.
A. Abdelnour.
In: Cycling and Control of Metals; Proceedings of Environmental Resources Conference, October 31-November 2, 1972, Columbus, Ohio: Environmental Protection Agency National Environmental Research Center, p 55-59, February 1973. 8 fig, 1 ref. NSF Grant GI-26 NSF RANN Grant GI-1605.

Descriptors: *Lead, *Path of pollutants, Mathematical models, *Biochemistry, Metabolism, Poisons, Heavy metals, Biological properties, Water pollution effects, *Absorption.
Identifiers: *Biological uptake(Heavy metals).

Models are able to predict the uptake, accumulation and distribution of trace metal contaminants in living organisms. These models, when coupled with studies on effects and alterations that these contaminants might inflict on the environment and its components, are extremely valuable to the decision maker. The body is divided into as many organs of interest as desired, and different types of input are considered. It is assumed that the transfer of the contaminant, namely lead, within the animal is accomplished via the blood and that the uptake and elimination of the contaminant follow a first order law. This implies that the instantaneous transfer rate from any given organ is directly proportional to the amount present in the organ. Mass equilibrium is satisfied at any given organ, and for the body as a whole. The mathematical model describing the uptake and elimination of lead is given by a set of first-order linear differential equations with constant parameters. Each equation states that the rate of change in accumulation within a given organ is equal to the uptake rate minus the elimination rate. (See also W74-09206) (Knapp-USGS)
W74-09211

EFFECT OF MINE DRAINAGE ON THE QUALITY OF STREAMS IN COLORADO, 1971-,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 5B.
W74-09228

PACIFIC NORTHWEST LABORATORY ANNUAL REPORT FOR 1973 TO THE USAEC DIVISION OF BIOMEDICAL AND ENVIRONMENTAL RESEARCH - PART 2, ECOLOGICAL SCIENCES,
Battelle-Pacific Northwest Lab., Richland, Wash. Environmental and Life Sciences Div.
W. E. Vaughan.
Available NTIS, Springfield, Va., as BNWL-1850, Pt. 2; $7.60/copy, $1.45/microfiche. Report No. BNWL-1850, Pt. 2, January 1974. 210 p, 60 fig, 55 tab, 187 ref.

Descriptors: *Ecology, *Ecosystems, *Research and development, *Freshwater, *Sea water, *Radioactivity, *Radioecology, Physics, Instrumentation, Biology, Land resources, Water resources, Plutonium, Radioactivity effects, Radioactive waste disposal, Public health, Food chains.

This report is concerned with research in land and freshwater sciences and marine sciences programs. Within these activities the following sciences are involved: (1) Radiological sciences; (2) physics and instrumentation; (3) biology; (4) water and land resources; and (5) ecological systems. During the year an extensive body of data has been assembled in the terrestrial ecology programs, a major part of which has been made computer retrievable, and preliminary modelling schemes tested. Additional effort was made in modelling specific ecosystems. A new plutonium program concerned with the comparative behavior of americium, plutonium, and the other main transuranium elements was commenced. A wide range of studies on the transuranium elements is in progress covering transport, food chain, health, fuel cycle, and production or waste management aspects. (See W74-09234 thru W74-09239) (Houser-ORNL)
W74-09233

ANALYSIS OF NATURAL SYSTEMS,
Battelle-Pacific Northwest Lab., Richland, Wash. Environmental and Life Sciences Div.
L. L. Eberhardt, R. O. Gilbert, J. M. Thomas, and M. I. Cochran.
In: Report BNWL-1850, Part 2, p 1-17, January 1974. 4 fig. 3 ref.

Descriptors: *Systems analysis, *Statistical models, *Ecosystems, Ecology, *Nuclear powerplants, *Effluents, *Water pollution, Air pollution, Fallout, Soil contamination, Absorption, Sampling, Cycling nutrients, Food chains, Transfer, Ion exchange, Path of pollutants, Dairy industry, Plutonium, Statistics, Mathematical studies, Public health.

Long-term efforts to understand the quantitative aspects of natural systems are continuing, with a considerable emphasis on the ecological aspects of the development of nuclear power. Recent emphasis on sampling for contaminants has been brought to the point where an exposition of certain basic aspects is feasible, and one such report was presented to the International Statistical Institute's 39th Session in Vienna last August. Efforts to model ecological systems have concentrated on radionuclide cycling and transfers, and much of the effort was devoted to appraisal of a dairy farm study. Appraisals of various statistical and mathematical aspects of ecology continued along the lines of past years, with the addition of an effort to produce a bibliography of quantitative methods in ecology. (See also W74-09233) (Houser-ORNL)
W74-09234

ENVIRONMENTAL CHEMISTRY,
Battelle-Pacific Northwest Lab., Richland, Wash. Environmental and Life Sciences Div.
For primary bibliographic entry see Field 5B.
W74-09235

FRESHWATER ECOLOGY,
Battelle-Pacific Northwest Lab., Richland, Wash. Environmental and Life Sciences Div.
C. D. Becker, R. G. Genoway, M. J. Schneider, C. E. Cushing, and D. G. Watson.
In: Report No. BNWL-1850, Pt. 2, p 57-100, January 1974. 21 fig, 11 tab, 24 ref.

Descriptors: *Freshwater, *Ecology, *Temperature, Environment, *Aquatic plants, *Aquatic animals, Biota, Fish, Water pollution, Tritium, Radioactivity, Biology, Geochemistry, Animal physiology, Plant physiology, Radioactivity effects, Radioactive waste disposal, Cycles, Ecosystems.

Studies are reported for effects of thermal discharges on aquatic biota and on fish behavior and sensory physiology, including combined effects of temperature, pollutants, and disease; effects of tritium on aquatic environments; and factors affecting biogeochemical cycling. Interaction of temperature with other environmental stresses and the relationship of temperature to physiological requirements are integral parts of this research program. Also consideration is given to the combined effects of temperature, chemical additives, e.g., biocides and corrosion inhibitors. The more radiosensitive embryonic and larval life stages of the aquatic environment were studied for the effects of tritium. The Columbia River and McNary Reservoir ecosystems were studied to determine the effects of ecosystems receiving radioactive wastes. (See also W74-09233) (Houser-ORNL)
W74-09236

MARINE SCIENCES,
Battelle-Pacific Northwest Lab., Richland, Wash. Environmental and Life Sciences Div.
W. B. Silker, D. E. Robertson, J. R. Van der Horst, R. Y. Ting, and C. W. Apts.
In: Report No. BNWL-1850, Pt. 2, p 101-120, January 1974. 2 fig, 7 tab, 5 ref.

Descriptors: *Marine biology, *Aquatic life, Environment, *Nuclear powerplants, *Effluents, *Water pollution, Radioactive waste disposal, Radioactivity effects, Ecosystems, Oily water, Oil spills, Geochemistry, Physiochemical properties, Physical properties, Chemical properties, Radiochemical analysis, Oceans.

Efforts in the marine sciences are geared towards a better understanding of man's impact upon the environmental quality of the oceans. Radioactivity, anthropogenic pollutants, oil, and thermal discharges are waste products of an industrial society which enter the marine environment. The physical, chemical and biological interactions of these additions are being characterized to predict their potential detrimental effects in the oceans. The basic chemical and mixing processes in the ocean are being investigated to understand and determine how anthropogenic additions to the marine environment interact and disperse. Research on the thermal resistance of selected marine organisms and the effects of crude oil on marine intertidal communities are being conducted at the Marine Research Laboratory, Sequim, Washington. (See also W74-09233) (Houser-ORNL)
W74-09237

RADIOLOGICAL SCIENCES,
Battelle-Pacific Northwest Lab., Richland, Wash. Environmental and Life Sciences Div.
C. E. Jenkins, J. C. Langford, D. E. Robertson, G. W. R. Endres, and C. W. Thomas.
In: Report No. BNWL-1850, Pt. 2, p 121-132, January 1974. 3 fig, 1 tab, 10 ref.

Descriptors: Environment, *Radioactivity, *Measurement, *Public health, *Assay, Research and development, *Human population, Iron, Marine microorganisms, Seawater, Assessment, Altitude, Analytical techniques, Mercury, Trace elements, Stable isotopes, Cesium, Animal pathology, Environmental effects.

Studies are reported on radiological-health, iron-55 in human populations, radio-analytical procedures, and fate and effects of radionuclides in Alaska. Efforts continued in measurements of the decline of radioactivity in various population groups. Studies in iron-55 concentrations revealed specific activities increased 10 to 30 fold in salmon between mid and northern altitudes. Procedures have been developed to measure specific elements

such as Hg found to co-exist with certain trace radioactive or stable constituents. Comparison of radionuclide concentrations in rumen contents and muscle tissue of caribou from Anaktuvuk Pass and Kobuk River regions during 1972-1973 winter seasons show that in Kobuk caribou Cs-137 concentrations are two to three times higher. (See also W74-09233) (Houser-ORNL)
W74-09238

TERRESTRIAL ECOLOGY,
Battelle-Pacific Northwest Lab., Richland, Wash. Environmental and Life Sciences Div.
J. F. Cline, W. H. Rickard, D. W. Uresk, J. D. Hedlund, and W. T. Hinds.
In: Report No. BNWL-1850, Pt. 2, p 133-171, January 1974. 21 fig, 11 tab, 13 ref.

Descriptors: Environment, *Ecology, Ecosystems, Research and development, *Biota, *Animal populations, *Speciation, *Plant populations, Primary productivity, Food chains, Soil contamination, Absorption, Transfer, Ion transport, Root systems, Burrows, Radioactivity effects, Radioactive waste disposal, Water pollution, Cycling nutrients, Model studies, Decaying organic matter, *Washington.

Terrestrial studies continue to contribute ideas and ecological data relevant to nuclear-power plant siting and the management of stored radioactive wastes in the semi-arid steppe region of Washington. These ideas and data are also largely applicable to steppe regions of Oregon, Idaho, and Nevada. Much of the available information concerning the ecology of steppe ecosystems has been gathered within the boundaries of the Arid Land Ecology Reserve, a place where long-term studies can be initiated with great assurance that the studies will not be interrupted by changing land use priorities. Today the concept of an ecological research area needs to be considered for waste management areas where opportunities are available to study the ecological behavior of radionuclides in the absence of resident human populations. These studies are relevant with the knowledge that rad-wastes will increase as a result of an expanding market for nuclear fueled power plants. This report reflects the integration of terrestrial ecology studies. Papers are grouped under the headings: energy and water relations, mineral nutrients, manipulation studies, consumers, primary producers, radiation studies, and modelling. (See also W74-09233) (Houser-ORNL)
W74-09239

5D. Waste Treatment Processes

MODELING OF HYDROLOGIC PROCESSES AND WATER SALVAGE PROCEDURES IN SEMIARID REGIONS,
Arizona Univ., Tucson. Water Resources Research Center.
S. D. Resnick.
Available from the National Technical Information Service as PB-232 834; $3.00 in paper copy, $1.45 in microfiche. Partial Technical Completion Report, December 1973. 7 p, 3 ref. OWRR A-020-ARIZ(8). 14-31-0001-3203.

Descriptors: *Arizona, *Water management(Applied), *Salvage value, Model studies, *Water reuse, Water costs, *Water utilization, Semiarid climates, Waste water treatment, Water quality standards, *Cost-benefits analysis.
Identifiers: *Tucson(Ariz).

Potential uses or reuses of salvageable waters in the Tucson region were examined, and costs and benefits related to such uses were evaluated. The quality of salvageable waters as determined in exploratory sampling was compared with water quality standards and criteria appropriate for agricultural, recreational and selected industrial uses. A tableau was then constructed which showed the type and estimated cost of conventional water treatment that would be required for each source-to-use combination. Finally, an estimate was made of unit net benefits to be anticipated from salvageable water input to these uses, and the net benefits were applied in several test calculations to illustrate mixed allocations of the various salvaged waters to the selected uses.
W74-08702

SEWAGE WATER IRRIGATION EFFECT ON COTTON GROWTH AND DEVELOPMENT, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
S. Khodzhakuliev.
Problosvoeniya Pustyn'. 5 p, 66-68. 1972. (English summary).
Identifiers: *Cotton growth, Growth, *Irrigation, *Mineralization, *Sewage water, Salts.

A ground water mineralization rate of 4 g/l can be used to irrigate cotton fields. An irrigation rate of 6000 m3/ha is recommended. Irrigation and treatments which decrease soil evaporation rate reduce the accumulation of salts.--Copyright 1973, Biological Abstracts, Inc.
W74-08729

TREATMENT OF BEET FACTORY-WASTE WATER BY ACTIVATED SLUDGE PROCESS (BIOSORPTION PROCESS), (IN JAPANESE),
Hokkaido Sugar Co. Ltd. (Japan).
M. Nogai.
Proceedings of the Research Society of Japan Sugar Refineries's Technologists, Vol 24, No 24, p 25-35, August 1973. 3 fig, 5 tab, 7 ref. English summary.

Descriptors: *Waste water treatment, *Water purification, *Recycling, *Activated sludge, Biochemical oxygen demand, Sugar beets, Industrial wastes, Design standards, Operation and maintenance, Hydrogen ion concentration, Temperature.
Identifiers: *Japan, Bulking, Phosphoric acid.

The purification of the waste water of the Honbetsu beet sugar factory by an activated sludge process is described. The process was effectively operated for four years, even in outdoor temperatures of -28C. The design standards of the installation are described. The recycle ratio of sludge was more than 70%. Since the capacity of the clarifier was insufficient, it was necessary to increase the up flow rate in the clarifier over the design rate. The dissolved oxygen in the sludge aeration tanks was 0.4-0.6 ppm. The expected minimum elimination of BOD5 was attained at 13C. The pH level of waste water should be kept at 6-9. The elimination ratio BOD5 obtained was 60-70% of the expected ratio. The excess sludge in running and final sludge were collected in a final pond, and they were decomposed by digestion in summer. When there was a fluctuation of pH value and a drop in waste water temperature, the activated sludge underwent bulking. The bulking stopped with the addition of phosphoric acid and it is concluded that soil adhering to beets and the beets themselves contain some nutrients that effectively activate the sludge. (Merritt-FIRL)
W74-08777

STUDIES OF RENOVATION OF PULP MILL WASTEWATER PILOT PLANT TESTS FOR GRANULAR ACTIVATED CARBON ADSORPTION OF KRAFT PULP MILL WASTEWATER, (IN JAPANESE),
Government Industrial Research Inst., Sikoku (Japan).
H. Kabeya, T. Fujii, and Y. Kimura.
Japanese Technical Association Industry Journal, Vol 27, No 11, p 543-553, November 1973. 10 fig, 7 tab, 7 ref. English summary.

Descriptors: *Pulp wastes, Investigations, *Adsorption, *Activated carbon, Lignins, Chemical oxygen demand, Activated sludge, Lime, *Waste water treatment.
Identifiers: *Japan.

Pilot plant tests for adsorption on granular activated carbon were conducted with lime treated water of unbleached kraft pulp wash waste water (lignin concentration 12-26 ppm, COD 25-44 ppm) and pretreated water of bleached kraft pulp caustic soda extract waste water (lignin concentration 33-120 ppm), treated by activated sludge and followed by lime. The possibility of renovation of these treated waters was investigated. At a superficial velocity of 1.7 m/hr and contact time of 140 min, the carbon usages of lime treated water were 3530 liter/kg air-dried carbon on the basis of lignin breakthrough curve and 3090 liter/kg air-dried carbon on the basis of COD breakthrough curve. The adsorption of lignin on activated carbon by lime treatment increases, but the adsorption of COD hardly increases. These results are consistent with the results obtained from adsorption isotherms of lime treated water and dilute water. Similarly, the carbon usage of pretreated water of caustic soda extract waste water was 130 liters/kg air-dried carbon on the basis of lignin breakthrough curve. (Merritt-FIRL)
W74-08778

DEVELOPMENT TRENDS IN POLLUTION-FREE PROCESSES.
Chemical Economy and Engineering Review, Vo 5, No 67, p 59-60, November, 1973. 2 tab.

Descriptors: *Recycling, *Industrial production, *Pollution abatement, Sewage, *Water reuse, Waste water treatment.
Identifiers: *Japan.

The development of closed systems of production in Japan as a method of pollution control is discussed. Central to this system is the recycling of materials used in the production process. According to a survey made by the Agency of Industrial Science and Technology, the process accounts for 31.9% of pollution abatement devices now being developed. The share is likely to increase to 42.5% five years later. There are plans to recover urban sewage as industrial water or to utilize gypsum by-produced from the desulfurization of flue gas. The closed system is designed to prevent secondary and tertiary pollution. As such it is part of a comprehensive system of pollution control. Efforts to clean the environment also involve attempts to change the sources of heat and some of the raw materials and, more importantly, to change the nation's industrial structure. (Merritt-FIRL)
W74-08783

DEEP-BED FILTRATION.
BAMAG Verfahrenstechnik G.m.b.H., Butzbach (West Germany).
For primary bibliographic entry see Field 5F.
W74-08784

HERE AND THERE.
Effluent and Water Treatment Journal, Vol 13, No 12, p 751-752, December, 1973.

Descriptors: *Effluents, *Water treatment, Industrial wastes, *Sewage disposal, Land use, Sludges, Dewatering, Organizations, Polymers, Polyelectrolytes, Flocculation, Water purification, Potable water, *Waste water treatment.

Research and newsbriefs on effluent and water treatment throughout the world are summarized. The question whether industry should use public sewers or provide its own treatment plants is being debated. There is renewed interest in the United States in the use of land as a means of disposing of sewage. The growth of the use of synthet

polymers in the dewatering of sludges illustrates that it takes a long time to prove the worth of chemicals that are gradually replacing those inorganic chemicals and precipitants and flocculants that greatly increase the amount of sludge to be handled. A consultant group convened by the WHO International Reference Centre for Community Water Supply recommends that polyelectrolytes should be employed in the purification of water for public supply only after careful consideration of possible toxic hazards. The Water Research Association and the Testing and Research Institute of the Netherlands Water Undertakings will hold a conference to discuss improvements in techniques for the distribution of drinking water. (Merritt-FIRL)
W74-08785

TURNKEY CONTRACTS FOR SEWAGE TREATMENT PLANTS,
S. Pinnell.
Civil Engineering-ASCE, Vol 44, No 1, p 86, January, 1974.

Descriptors: *Contracts, *Sewage treatment, Costs, Utilities, *Waste water treatment, *Treatment facilities.
Identifiers: Turnkey contracts.

The disadvantages of turnkey contracting procedures for sewage treatment plants are summarized. Conventional contracting can provide better organization of pollution control efforts. The direct costs of turnkey contracting will normally be substantially higher than conventional contracting. Turnkey contracting does not generally result in design innovation unless special provisions are written into the design construction contract. Turnkey contracts would tend to limit competition to large design constructors. This restriction is too serious to justify the use of turnkey contracting in public works, especially when other contractual arrangements or improvements in conventional contracting could produce similar time reduction and at less cost. (Merritt-FIRL)
W74-08786

RESEARCH ROUND UP.
Effluent and Water Treatment Journal, Vol 13, No 12, p 791, December, 1973. 1 fig.

Descriptors: *Waste water treatment, *Water treatment, *Denitrification, Nitrogen, Packed beds, Nitrilotriacetic acid, Investigations, Bacteria, Sludge, Activated sludge, Sand, Filtration, Coals, Sluries, Canada.
Identifiers: England, India, Mutants.

Current research in waste and water treatment is summarized. Studies on the kinetics of packed bed denitrification at the University of California concluded that the denitrification process can be operated near the maximum unit removal rate and still obtain acceptable nitrogen conversion, regardless of the reactor configuration. A bacterial mutant was isolated at the Canadian Centre for Inland Waters from waste water after ultraviolet mutagenisation and penicillin selection and was shown to have higher affinity for nitrilotriacetic acid using concentrations up to 2.5 percent as sole carbon, nitrogen, and energy source over a wide temperature and pH range, without acclimatization. At the National Environmental Research Center in Cincinnati, pilot-plant experiments on the effect of waterworks sludge on the activated sludge process show there are no adverse effects. The Central Public Health Engineering Research Institute at Nagpur successfully substituted bituminous coal for anthracite for use with sand for dual media filtration. (Merritt-FIRL)
W74-08787

DIRECT FILTRATION: AN ECONOMIC ANSWER TO A CITY'S WATER NEEDS,
Springfield Municipal Water Works, Mass. Water Dept.
G. E. Sweeney, and P. W. Prendiville.
Journal of the American Water Works Association, Vol 66, No 2, p 65-71, February, 1974. 4 fig.

Descriptors: *Municipal water, *Filtration, *Waste water treatment, Water works, History, *Massachusetts, *Treatment facilities, Costs, Water treatment.
Identifiers: *Springfield(Mass).

The history of the Springfield, Mass., water system and the background of engineering investigations are described. The first community water supply in the city was developed in 1848. The city took over operations in 1872, and the reservoir had a yield of 10 mgd. The total average daily water consumption increased from 17 mgd in 1940 to 41 mgd in 1971. Currently about 33% of the supply is used by industry. An engineering report of 1970 recommended the immediate construction of a 60 mgd direct filtration plant, to be operated in conjunction with the slow sand filters. It was also recommended that the new facilities be designed to facilitate expansion of the plant to an ultimate capacity of 180 mgd. The report set a reasonable budget and schedule for the project. The plant is scheduled to go into operation in early 1974. The construction cost of the direct filtration facilities is now estimated at about $88,000/mil gal of capacity, considerably lower than expected for a plant of this size. (Merritt-FIRL)
W74-08788

PHOSPHATE REMOVAL BY MAGNETIC FILTRATION,
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
G. Bitton, R. Mitchell, C. de Latour, and E. Maxwell.
Water Research, Vol 8, No 2, p 107-109, 1974. 2 fig, 2 tab, 12 ref.

Descriptors: *Phosphates, Investigations, *Filtration, Sampling, Color, Rivers, *Separation techniques, Suspended solids, Tertiary treatment, Clays, Montmorillonite, Effluents, *Massachusetts, *Waste water treatment.
Identifiers: *Charles River(Mass), *Magnetic separation, Magnetite, Alum.

The removal of phosphate from natural water by magnetic separation was investigated under carefully controlled conditions. Water from the Charles River, Boston, was sampled at three different locations and was treated by magnetic filtration to reduce its phosphate content. The removal of phosphorus approached the 90 percent level in the three locations. The suspended solid content and the color of the Charles River samples were reduced significantly. The effluents obtained by magnetic filtration were all very clear and did not contain any trace of montmorillonite. It is concluded that magnetic filtration is a rapid process that requires only a few minutes retention after the addition of magnetite, alum, and clay to the water samples. The process could be used as an alternative to settling tanks in the tertiary treatment of wastes. (Merritt-FIRL)
W74-08789

TUNNEL FAILURE DELAYS SEWER SYSTEM STARTUP.
For primary bibliographic entry see Field 8C.
W74-08790

TALE OF TWIN CITIES, CUTTING THE HIGH COSTS OF POLLUTION CONTROL.
Instrumentation, Vol 27, No 1, p 12-15, 1974. 5 fig.

Descriptors: *Waste water treatment, *Sewage treatment, Aeration, Sludge disposal, Incineration, Effluents, Chlorination, Flow, *Treatment facilities, *Minnesota.
Identifiers: *St. Paul(Minn), *Minneapolis(Minn).

The centralized waste water treatment facility of the Twin Cities area in Minnesota is described. It serves a 3000 sq mile area with a population of over 2 million people and a commercial/industrial population equivalent to an additional million persons. The plant is completely integrated, meaning that its processes include secondary as well as primary treatment, sludge incineration, and chlorination of the effluent prior to discharge into the Mississippi River. Average flow capacity through the plant is 218 mgd. A major expansion program over the next five years will boost this to 290 mgd in a first step, with a potential flow capacity of 350 mgd in the long range future. (Merritt-FIRL)
W74-08796

THE INVESTIGATION OF BIODEGRADABILITY OF BRANCHED NONYL PHENOL ETHOXYLATES,
Swedish Water and Air Pollution Research Lab., Stockholm.
L. Rudling, and P. Solyom.
Water Research, Vol 8, No 2, p 115-119, 1974. 4 fig, 2 tab, 7 ref.

Descriptors: *Activated sludge, Investigations, *Biodegradation, *Phenols, Municipal wastes, Sewage, Surfactants, *Waste water treatment.
Identifiers: *Sweden, *Nonyl phenol ethoxylates.

The biodegradability of branched chain nonyl phenol ethoxylates was investigated according to a screening test procedure recommended by Organization for Economic Cooperation and Development (OECD). Also a study was conducted in a laboratory-scale activated sludge system operated with presettled municipal sewage under treatment plant conditions. The results show that there is no significant difference between the biodegradability of the different nonyl phenol ethoxylates containing 8-30 ethylene oxide groups. The removal of surfactants exceeds 90% and no acclimatization was needed in activated sludge treatment under plant conditions. (Merritt-FIRL)
W74-08798

NITROGENOUS COMPOUNDS IN THE ENVIRONMENT.
Environmental Protection Agency, Washington, D.C. Hazardous Materials Advisory Committee.
For primary bibliographic entry see Field 5B.
W74-08835

TRANSIENT ANALYSIS OF A STATE PARK EXTENDED AERATION WASTEWATER FACILITY,
Maryland Univ., College Park. Dept. of Chemical Engineering.
W. W. Hellier, Jr., and T. W. Cadman.
Available from the National Technical Information Service as PB-232 957 $5.75 in paper copy, $1.45 in microfiche. University of Maryland Water Resources Research Center Technical Report No 24, (1973) 186 p, 44 fig, 3 tab, 151 ref, 3 append. OWRR A-021-MD (1), 14-31-0001-3520. *Waste water treatment, Treatment facilities, Biological treatment, *State parks, *Pennsylavnia, *Aeration, *Biochemical
Identifiers: *Extended aeration, Prince Gallitzin St. Pk.(Penn).

Experimental data on the transient operation of the extended aeration wastewater treatment plant at Pennsylvania's Prince Gallitzin State Park have been collected and the system has been mathematically modeled. Time-variant inlet hydraulic flows were obtained through continuous measurement, and organic loading data were based on grab samples analyzed for biochemical oxygen demand (BOD) and volatile suspended solids concentration. Effluent BOD was used as the criterion for comparing the predicted with the observed time-variant plant response to loadings. Three mathematical models were developed for the simulations. The first represented the plant as well mixed

system with BOD destruction given by first order kinetics. The second represented the plant as a series of equal volume well mixed stages, with all BOD in solution and being destroyed by a first order kinetic reaction. The third represented the plant as a well mixed system with BOD both in solution and in the suspended solid phase. Direct destruction of dissolved and solid BOD was considered to be by separate first order kinetic reactions. A second-order conversion of solid to dissolved BOD was also assumed. The well mixed model is selected as the preferred model based upon the data now available for the system.
W74-08838

DEVELOPMENT OF A HIGH PRODUCT WATER RECOVERY SYSTEM FOR THE TREATMENT OF ACID MINE DRAINAGE BY REVERSE OSMOSIS,
Envirex, Inc., Milwaukee, Wis. Environmental Sciences Div.
M. K. Gupta.
Available from the National Technical Information Service as PB-230 756/AS, $6.25 in paper copy, $1.45 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-939, March 1974. 51 p, 7 fig, 11 tab, 14 ref. OSW Contract 14-30-3020.

Descriptors: *Demineralization, *Desalination, Descaling, Membrane process, Membranes, Pilot plants, *Reverse osmosis, Saline water, Scaling, Ion exchange, Water reuse, *Waste water treatment, *Mine drainage, Acid mine water, Neutralization, *Water softening.
Identifiers: Sodium hexameta-phosphate, Membrane fouling, Citric acid, Soda ash softening, Sodium aluminate softening, Carbon dioxide softening, Ion exchange softening, Sludge recycling, Cost estimate.

The objective was to develop a high product water recovery reverse osmosis (RO) system for the treatment of acid mine drainage. Depending on raw water quality the overall water recovery was limited to about 95% because of the buildup of saturation concentrations of calcium sulfate. Brines saturated with CaSO4 were produced via a portable RO unit employing hollow fiber B-9 membranes for a number of neutralization and softening tests. Various alkaline agents such as lime, limestone, sodium hydroxide and soda ash were evaluated for the neutralization of the brines produced from the first stage RO processing of raw acid mine waters. The presence of ferric iron in the feed above a pH level of 2.6 contributed to the fouling of the membranes. Addition of sodium sulfite aided in reducing the iron to the ferrous state. Biochemical oxidation and limestone-lime combination treatment to a pH of 10.8 was concluded to be the most suitable and economic method of neutralization. Treatment costs for a 10 million GPD capacity plant were: 15.7 cents per 1000 gallons - capital costs; and 59 cents per 1000 gal - operating costs. (OSW)
W74-08841

PHOSPHORUS REMOVAL DESIGN SEMINAR, CONFERENCE PROCEEDINGS NO. 1.
Environmental Protection Service, Ottawa (Ontario).
Research Program for the Abatement of Municipal Pollution under Provisions of the Canada-Ontario Agreement on Great Lakes Water Quality, Conference held May 28-29, 1973, Toronto, Canada. 359 p. (1973).

Descriptors: *Phosphorus compounds, *Waste water treatment, Treatment facilities, Biological treatment, Sludge treatment, Information exchange, *International Joint Commission, Activated sludge, Design criteria, Sewage treatment, *Research and development, *Canada.
Identifiers: *Phosphorus removal.

In response to the International Joint Commission recommendations, the Canadian federal government and the government of Ontario signed an agreement in August, 1971. Under the terms of the Canada-Ontario Agreement on Great Lakes Water Quality, the two governments undertook to accelerate the construction of pollution control facilities in the Great Lakes Basin, and provide funding for treatability studies and research designed to improve pollution control technology. The province of Ontario and Ontario municipalities are presently involved in a five-year program to control, by 1975, phosphorus discharges from more than 200 existing wastewater treatment plants serving some 4.7 million people. For the most critically affected areas of the province, permanent phosphorus removal facilities must be operational by December 31, 1973. In view of this deadline and the fact that the development of design parameters for phosphorus removal facilities is in its infancy it became apparent that a seminar of this nature should be of considerable assistance to those involved in the design of these facilities. This seminar was intended to provide an exchange of information between consulting engineers and government personnel involved in the design and approval of phosphorus removal facilities at waste treatment plants. (See W74-08847 thru W74-08862)
W74-08846

PHOSPHORUS REMOVAL IN ONTARIO,
Ministry of the Environment, Toronto (Ontario). Sanitary Engineering Branch.
G. L. Van Fleet.
In: Phosphorus Removal Design Seminar, Conference Proceedings No 1, (1973). 25 p, 1 fig, 6 ref.

Descriptors: *Research and development, *Waste water treatment, *Treatment facilities, *Methodology, Data collections, Design criteria, Economics, Efficiencies, Chemical precipitation, *Canada.
Identifiers: *Phosphorus removal.

The integration of chemical treatment into existing waste water treatment plants in Ontario has necessitated the development of a research methodology capable of providing in a very short time period sufficient design information to successfully implement the Province's phosphorus removal program. This methodology has involved both treatability studies and intensive research investigations. The treatability studies are proceeding at all waste water treatment plants requiring phosphorus removal and it is expected that the resultant data will contribute to the design of the most efficient and economical chemical process for each particular plant within the required timing. Research and demonstration projects have made it possible to demand permanent facilities to meet the required percent phosphorus removal or effluent quality criteria. Continuing investigations will produce more accurate information on sludge handling and disposal and will improve upon existing waste water treatment technology. (See also W74-08846) (Sandoski-FIRL)
W74-08847

GUIDELINES FOR CONDUCTING TREATABILITY STUDIES FOR PHOSPHORUS REMOVAL AT WASTEWATER TREATMENT PLANTS.
Ministry of the Environment, Toronto (Ontario).
In: Phosphorus Removal Design Seminar, Conference Proceedings No 1, (1973). 24 p, 1 fig, 2 tab.

Descriptors: *Waste water treatment, *Treatment facilities, Investigations, Coagulation, Chemical treatment, Pilot plants, Methodology, Sludge disposal, Sludge treatment, *Canada.
Identifiers: *Phosphorus removal, *Investigation guidelines.

An information brief for consulting engineers and municipal officials as well as a supplement to Guidelines For Initiating Treatability studies is given. These guidelines are designed to assist personnel involved in carrying out phosphorus removal treatability studies in determining the most efficient and economical means to implement phosphorus removal through chemical addition at existing waste water treatment plants. The methodology, which includes both jar testing and pilot study phases, allows the prediction of the prime coagulant best suited for phosphorus removal at any particular treatment facility and a determination of whether the chemical used has any affect on the existing waste water treatment process, facilities, method of sludge treatment, and subsequent sludge disposal practices. The choice of chemical is limited to the process most compatible with sewage characteristics and the existing facilities, taking into account the physical layout of the plant and the delivered cost and availability of the particular chemical. (See also W74-08846) (Sandoski-FIRL)
W74-08848

PHOSPHORUS REMOVAL BY CHEMICAL ADDITION USING PRIMARY TREATMENT,
A. Wilkes.
In: Phosphorus Removal Design Seminar. Conference Proceedings No 1, (1973). 17 p, 1 fig.

Descriptors: *Chemical precipitation, *Sewage treatment, *Phosphates, Chemical reactions, Flocculation, Methodology, *Waste water treatment, *Canada.
Identifiers: *Phosphorus removal.

Phosphorus removal by chemical addition ahead of primary clarification is a vaiable technique for controlling phosphorus discharges at sewage treatment plants. For the purposes of this study, primary treatment for phosphorus removal is defined in terms of the point of addition of chemical. The types of phosphorus compounds present in sewage such as ortho-phosphates, polyphosphates, and organic phosphates are discussed. The mechanism of phosphorus removal which includes precipitation of phosphorus compounds, chemical reactions, and solids flocculation, together with practical considerations and experience are mentioned. (See also W74-08846) (Sandoski-FIRL)
W74-08849

CHEMICAL PRECIPITATION FOR BIOLOGICAL AND POSTBIOLOGICAL TREATMENT,
J. D. Norman.
In: Phosphorus Removal Design Seminar. Conference Proceedings No. 1 (1973). 14 p, 6 fig.

Descriptors: *Chemical precipitation, *On-site testing, *Treatment facilities, *Performance, Equipment, Effluents, Optimization, Efficiencies, *Canada, *Waste water treatment.
Identifiers: *Phosphorus removal.

Chemical precipitation at full-scale treatment plants in several plants in Ontario, Canada has been observed. Comments are made on some of the factors (chemical choice, point and rate of application, control of chemical feed, and the effect of plant operation) affecting the performance of chemical precipitation processes and the effect or lack of effect of several variables tested. Conclusions suggest the following: chemical solutions are not difficult to obtain, the jar testing procedure is consistent for a given waste, equipment for chemical application is inexpensive and portable, systems should also provide improved effluent quality, and system optimization requires a longer testing period than eight weeks. (See also W74-08846) (Sandoski-FIRL)
W74-08850

PHOSPHORUS REMOVAL IN SEASONAL RETENTION LAGOONS BY BATCH CHEMICAL PRECIPITATION,
Ministry of the Environment, Toronto (Ontario).
H. J. Graham, and R. B. Hunsinger.

In: Phosphorus Removal Design Seminar, Conference Procedings No. 1 (1973). 25 p, 4 fig, 1 tab, 12 ref.

Descriptors: *Aluminum, *lime, *Chlorides, *Iron, *Testing, *Chemical precipitation, Effluents, Phosphorus, Biochemical oxygen demand, Performance, *Canada, *Waste water treatment.
Identifiers: *Phosphorus removal.

Alum, ferric chloride, and lime have been tested as a means of phosphorus removal in the batch chemical treatment of seasonal retention lagoons. The required dosages were determined by jar tests, a highly reliable method in predicting the post-treatment results in a lagoon. Lagoon discharge was usually begun the day after treatment and continued for an average of eight days. Both alum and ferric chloride produced a high quality effluent, low in phosphorus and BOD. The lime application initially produced a high quality effluent, but deteriorated rapidly over the drawdown period. (See also W74-08846) (Sandoski-FIRL)
W74-08851

DESIGN CONSIDERATIONS IN THE IMPLEMENTATION OF ONTARIO'S PHOSPHORUS REMOVAL PROGRAMME,
Ministry of the Environment, Toronto (Ontario). Research Branch.
B. I. Boyko, and J. W. G. Rupke.
In: Phosphorus Removal Design Seminar, Conference Proceedings No. 1 (1973). 34 p, 8 fig, 5 tab, 10 ref.

Descriptors: *Waste water treatment, Phosphorus, *On-site testing, *Treatment facilities, *Chemical precipitation, Coagulation, Activated sludge, Effluents, Anaerobic digestion, Sludge treatment, *Canada.
Identifiers: *Phosphorus removal.

The predictive methodology, operational results, problem areas, and design considerations that have resulted from the full scale phosphorus removal studies conducted at waste water treatment facilities ranging in size from 0.05 to 24.0 mgd capacity are discussed. Also, the results of studies involving phosphorus removal through continuous chemical addition to waste stabilization pond are disclosed. The following conclusions are presented: a satisfactory predictive technique was developed that allows a rational selection of lime coagulant to be used for phosphorus removal at a treatment facility; phosphorus removal was readily implemented with minimal capital expenditure; satisfactory effluent quality was attained by the activated sludge process and its modifications when phosphorus removal was practised; increased sludge production was experienced at all systems; and, anaerobic digestion of chemical sludges associated with phosphorus removal was successful with no significant phosphorus release being observed. (See also W74-08846) (Sandoski-FIRL)
W74-08852

PHOSPHORUS REMOVAL ON SECONDARY EFFLUENTS,
Environmental Protection Service, Ottawa (Ontario).
J. E. Shannon.
In: Phosphorus Removal Design Seminar, Conference Proceedings No. 1 (1973). 16 p, 7 fig, 30 ref.

Descriptors: *Chemical precipitation, Phosphorus compounds, Equipment, Biochemical oxygen demand, Mixing, Flocculation, Hydrogen ion concentration, Filtration, *Canada, *Waste water treatment.
Identifiers: *Phosphorus removal, Clarification.

Phosphorus precipitation by chemical addition to the secondary effluent requires the addition of separate equipment onto the existing facility and reduces the effluent total phosphorus levels in the order of .1 to .5 mg/liter and reduces the BOD to less than 10. Some alternatives for post-precipitation are depicted, with the individual components being flash mixing, flocculation, and clarification, or the three combined in a reactor clarifier, pH adjustment, and filtration. Design aspects of the various stages in post precipitation are discussed. (See also W74-08846) (Sandoski-FIRL)
W74-08853

SOME PLANT DESIGN CONSIDERATIONS IN PHOSPHORUS REMOVAL FACILITIES,
G. A. Aldworth.
In: Phosphorus Removal Design Seminar, Conference Proceedings No. 1 (1973). 19 p, 2 fig.

Descriptors: *Design criteria, *Phosphorus compounds, *Chemical treatment, Equipment, Corrosion, Treatment facilities, Lime, Aluminum, Chlorides, Iron, *Canada, *Waste water treatment.
Identifiers: *Phosphorus removal, Feed systems.

Described are areas related to detailed design for phosphorus removal with the following topics explored: effects of encrustation and corrosion; representative chemical feed systems; and, the effect of chemicals on plant elements such as air diffusers, pumps, tanks, and piping. Emphasized are schemes involving the storage and feeding of large amounts of chemicals received in bulk form. A summary of guidelines for the use of lime treatment and alum or ferric chloride treatment in phosphorus removal is included. (See also W74-08846) (Sandoski-FIRL)
W74-08854

PHOSPHORUS REMOVAL COSTS,
G. Powell, and P. Crawford.
In: Phosphorus Removal Design Seminar, Conference Proceedings No 1 (1973). 38 p, 9 fig, 2 tab, 8 ref.

Descriptors: *Costs, *Economic efficiency, *Waste water treatment, Lime, Sludge disposal, Data collections, Water quality control, Effluents, Treatment facilities, Chemical precipitation, *Canada.
Identifiers: *Phosphorus removal.

A significant factor to phosphorus removal costs pertaining to waste water plants is the designer's familiarity with the effect of the phosphorus removal chemicals on the treatment processes. Insufficient data are presently available for accurate costs of phosphorus sludge disposal and the effect of lime on the biological treatment at elevated hydrogen ion concentrations. As effluent standards are made more stringent to safeguard waters, treatment costs will increase. Thus, with higher and more sophisticated degrees of treatment, a better understanding of the operation and the economics of the treatment processes involved will result. (See also W74-08846) (Sandoski-FIRL)
W74-08855

INSTRUMENTATION AND AUTOMATIC CONTROL OF PHOSPHORUS REMOVAL PROCESSES,
Dow Chemical Co., Midland, Mich. Environmental Control Systems.
S. L. Daniels.
In: Phosphorus Removal Design Seminar, Conference Proceedings No 1 (1973). 21 p, 7 fig, 1 tab, 17 ref.

Descriptors: *Waste water treatment, *Phosphorus, *Chemical precipitation, *Flocculation, Instrumentation, *Control systems, Monitoring, Measurement, *Canada.
Identifiers: *Phosphorus removal.

Significant reductions of all phosphorus species present in municipal waste water are technically feasible in existing treatment plants before effluents are discharged into receiving waters. These reductions are accomplished by modifying conventional and flocculation processes. Instrumentation in both coagulation and flocculation processes has been limited to controlling the storage and preparation of chemicals, the metering of chemical additions, and the monitoring of influent and effluent qualities. Comparisons of typical flocculant preparation systems, flocculant addition systems, and coagulant addition systems for five ranges of total plant flow are summarized. (See also W74-08846) (Sandoski-FIRL)
W74-08856

CHEMICAL HANDLING: THE CHEMICAL FEEDER AND ITS RELATED SYSTEM WHEN APPLIED TO ALUM, FERRIC CHLORIDE, LIME AND POLYMERS,
Control and Metering Ltd., Toronto (Ontario).
T. Fahlenbock.
In: Phosphorus Removal Design Seminar, Conference Proceedings No. 1 (1973). 30 p, 7 fig, 3 tab.

Descriptors: *Chemical precipitation, *Equipment, Measurement, Design criteria, Operation and maintenance, Performance, Alum, Iron, Chlorides, Lime, *Canada, *Waste water treatment.
Identifiers: *Chemical feeder, *Phosphorus removal.

Various characteristics of the chemical feeder or metering pump including basic design, operation, accuracy, sizing, system components, stages of design development, and performance specifications, are detailed. Also discussed are the maximum and minimum feed rates for the feeder as well as its ability to handle alum, ferric chloride, dry polymers and lime. (See also W74-08846) (Sandoski-FIRL)
W74-08857

USE OF LIME FOR PHOSPHORUS REMOVAL,
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
B. P. Le Clair, and E. Ladouceur.
In: Phosphorus Removal Design Seminar, Conference Proceedings No. 1 (1973). 15 p, 6 fig, 3 tab, 7 ref.

Descriptors: *Lime, *Design criteria, *Operation and maintenance, *Cost comparisons, *Waste water treatment, Chemical precipitation, *Canada.
Identifiers: *Phosphorus removal.

Process design information and operating experience on the use of lime, including the direct use of dry unslaled lime for phosphorus removal, are summarized. Of the three methods demonstrated at full scale, the method involving dry hydrated lime storage in a silo and batch continuous slurry makeup is preferred. Approximately 25 percent chemical cost saving should be realized with the method as well as fewer operating difficulties. (See also W74-08846) (Sandoski-FIRL)
W74-08858

ACTIVATED SLUDGE CHARACTERIZATION AND SETTLING,
Environmental Protection Service, Ottawa (Ontario).
R. Zaloum.
In: Phosphorus Removal Design Seminar, Conference Proceedings No. 1 (1973). 15 p, 6 fig, 6 ref.

Descriptors: *Activated sludge, Physical properties, Chemical properties, Biological properties, Investigations, *Canada, *Waste water treatment.
Identifiers: *Sludge characterization, *Phosphorus removal.

This study is a portion of a sludge dewatering and reduction project aimed at the characterization of sludges with respect to physical, chemical, and biological properties and the correlation of these properties with various process units. Some of the progress achieved in this area is presented and discussed. The methods presently used for the determination of clarifier areas are evaluated. Typical results are presented. (See also W74-08846) (Sandoski-FIRL)
W74-08859

THICKENING AND DEWATERING SLUDGES PRODUCED IN PHOSPHATE REMOVAL,
C. H. Knight, R. G. Mondoux, and B. Hambley.
In: Phosphorus Removal Design Seminar, Conference Proceedings No. 1 (1973). 17 p, 4 fig, 7 ref.

Descriptors: Treatment facilities, Efficiencies, *Dewatering, *Sludge treatment, *Chemical precipitation, Water balance, *Waste water treatment, *Canada.
Identifiers: *Phosphorus removal, *Sludge thickening, Treatment methods.

The effect of adding 80 percent phosphate removal facilities on the capacity and efficiency of dewatering processes is examined. Material and water balances and average capacity figures are developed for the various dewatering processes and different chemical additions. No two sludges are alike; bench scale and plant scale tests are desirable to confirm critical design conditions. The various treatment methods studied include gravity thickening, flotation thickening, nozzle discharge disc centrifuge thickening, vacuum filtration, and conveyor type centrifuge dewatering. (See also W74-08846) (Sandoski-FIRL)
W74-08860

A CURSORY LOOK AT THE IMPACT OF PHOSPHORUS LADEN SLUDGES ON CONVERSION PROCESSES,
R. V. Villiers.
In: Phosphorus Removal Design Seminar, Conference Proceedings No 1, (1973). 20 p, 6 tab, 14 ref.

Descriptors: *Sludge treatment, Heat treatment, *Incineration, *Anaerobic digestion, *Aerobic treatment, *Chlorination, Lime, Phosphorus, Temperature, Hydrogen ion concentration, Mixing time, Organic matter, Operations, *Canada, *Waste water treatment.
Identifiers: *Phosphorus removal, Sludge characteristics, Loading.

Conversion processes alter sludge constituents to make them inoffensive, nonviable, or unextractable to permit reuse or return of the sludge to the environment. Such processes include heat treatment, incineration, anaerobic digestion, aerobic digestion, chlorination, or lime treatment. All processes are temperature and pH dependent; sensitive to change in loading, time, and mixing; sensitive to change in air and food supply; and concerned with organic matter destruction or stabilization. Cause-effect relationships between the process and phosphorus-sludge are predicted by relating the following three categorizations to the various conversion processes. The categorizations are: changes in sludge characteristics; process operating parameters; and, changes in sludge components during conversion. (See also W74-08846) (Sandoski-FIRL)
W74-08861

LAND APPLICATION OF PROCESSED ORGANIC WASTES,
Ministry of the Environment, Toronto (Ontario). Waste Management Branch.
G. M. Wood.
In: Phosphorus Removal Design Seminar, Conference Proceedings No 1, (1973). 29 p, 2 tab.

Descriptors: *Regulation, *Governments, *Organic wastes, *Waste disposal, *Waste treatment, *Soil disposal fields, Soil engineering, Sites, *Canada.
Identifiers: *Phosphorus removal.

Under the authority of the recent amendments to Regulation 824 of the Revised Regulations of Ontario, 1970, the Ministry of the Environment is undertaking the certification of haulers, organic waste management systems, and organic soil conditioning sites for the disposal of processed organic waste. According to the amendment, 'No person shall use, operate, establish, alter, enlarge, or extend a waste management system or a waste disposal site' unless governmental approval has been received. Standards for the location, maintenance, and operation of an organic soil conditioning site which include such topics as site location, land characteristics, site management, and sludge application rates are discussed. (See also W74-08846) (Sandoski-FIRL)
W74-08862

THE BALANCE BETWEEN WASTE TREATMENT AND WASTE DISCHARGE IN THE U.S., 1957-2000,
Monash Univ., Clayton (Australia). Dept. of Mechanical Engineering.
I. G. Wallis.
Journal of the Water Pollution Control Federation, Vol 46, No 3, p 438-457, March, 1974. 3 fig, 11 tab, 54 reg.

Descriptors: *Waste water treatment, *Water quality, *Phosphorus, Agricultural wastes, Domestic wastes, Human population, Costs, Effluents, *Waste treatment, Sewage systems, Oxygen demand, *Waste disposal.

If overall river quality level is to improve, treatment efficiency must increase even faster than the rate of increase of waste generation. The treatment level required to maintain a constant level of waste discharge is estimated for years 1970 to 2000. Two ubiquitous wastes are phosphorus wastes-generated primarily from domestic and agricultural sources, and oxygen demanding wastes--produced from industrial sources. Factors for increase in phosphorus wastes were population increase, growth in detergent use, expansion of the sewage system, and increased rural runoff of phosphoric fertilizers. High costs of waste treatment include changing raw material input, production process, recovering materials from the effluent, and transforming effluents into a useful by-product. The technological advances necessary to reduce waste discharge and hence improve water quality, a feasible but costly process are discussed. (Prague-FIRL)
W74-08868

EVALUATION OF A ROTATING DISK WASTEWATER TREATMENT PLANT,
Autotrol Corp., Milwaukee, Wis. Bio-Systems Div.
R. L. Antonie, D. L. Kluge, and J. H. Mielke.
Journal of the Water Pollution Control Federation, Vol 46, No 3, p 498-511, March, 1974. 11 fig, 4 tab, 5 ref.

Descriptors: *Waste water treatment, *Biochemical oxygen demand, *Nitrification, *Organic loading, *Suspended solids, Hydraulics, Sludge treatment, Treatment facilities.
Identifiers: Waste water treatment plant, Hydraulic loading, Treatment plant construction, Sludge Solids.

After nine out of twelve months of an evaluation period, a 0.5 mgd (1.9-mil liter/day) rotating disk municipal waste water treatment plant has been highly successful. Capability is shown of achieving high degrees of biochemical oxygen demand and suspended solid removal and nitrification. The variables investigated included rotational disk velocity, hydraulic loading, and exposure to different climatic conditions. The plant exhibited stable operation under conditions of fluctuating hydraulic and organic loading and waste water temperature. High density of sludge solids indicates significant potential savings in treatment plant construction and operating costs. (Prague-FIRL)
W74-08869

STARTUP AND OPERATION OF THE ROCKVILLE WATER TREATMENT PLANT,
Rockville Water and Aqueduct Co., Conn.
For primary bibliographic entry see Field 5F.
W74-08872

WATER UTILITIES OPERATOR TRAINING: A WORTHY INVESTMENT,
Texas Water Quality Board, Austin. Central Operations Div.
H. D. Jobes.
Water and Sewage Works, Vol 121, No 4, p 58-59, April, 1974.

Descriptors: Training, *Operations, *Evaluation, Personnel, *Texas, Water quality, Investment, Water pollution control, *Treatment facilities.

A study made for the Environmental Protection Agency on a water utilities operator training program in Texas is discussed. Methodology of the study was to examine treatment plant operations as they existed before employee training and to examine results after training. The effectiveness evaluation study document states in its conclusion that for every dollar invested in training, the equivalent of an additional $91 investment in capital plant was activated in terms of improved performance. The degree of reduction of BOD, total suspended solids, and levels of overall improvements following training indicated conclusively that for these plants the value of return on training was high in terms of both dollars invested and cleanliness of water treatment. (Merritt-FIRL)
W74-08879

FLOC BLANKET CLARIFICATION.
Effluent and Water Treatment Journal, Vol 14, No 1, p 51 January, 1974.

Descriptors: *Waste water treatment, *Chemical properties, *Hydraulic properties, Water purification, Equipment, Flocculation, Iron compounds, Rivers.
Identifiers: *Floc blanket clarifiers, *Czechoslovakia.

Laboratory experiments at the Technical College at Zilina and full scale tests at Brno in Czechoslovakia have been investigating the floc blanket clarifiers in terms of hydraulic and chemical characteristics. In the laboratory a 300 mm diameter by 3 m high column received chemically dosed water entering tangentially at the base. At upflow velocities of 1.2 mm/s floc volume concentrations were uniform with depth at about 20%, but solids fraction values increased with depth, usually increasing by about 20% from top to bottom. The actual values of solids fraction depended on the chemicals which had been added. River water was utilized at Brno and when the water temperature exceeded 10 C the upflow rate was 1.3 mm/s, but during winter the output fell to about 0.8 mm/s. Previously, output had been sustained by 25 mg/liter bentonite, but it was learned that 0.3 mg/liter starch produced the required results. Performance was assessed in terms of residual iron in the clarified water. The iron could be measured against performance characteristics; the flocculation product was the most sensitive parameter with an optimal value of 3000. (Merritt-FIRL)
W74-08884

TURBIDITY CONTROL BY AUTOMATIC DIVERSION,
Treatment and Supply, Aspen, Colo.
J. J. Markalunas.
Water and Sewage Works, Vol 121, No 2, p 44-45, February, 1974.

Descriptors: *Waste water treatment, *Diversion structures, *Turbidity, *Automatic control, *Chemical treatment, Treatment facilities, Water purification, Iron compounds, Industrial wastes, *Colorado.
Identifiers: *Aspen(Colo), Turbidimeters.

The automatic raw water diversion system and automatic chemical dosage system for turbidity control at the Aspen, Colorado treatment plant are described. At times the water supply for Aspen (Castle Creek) becomes highly turbid and high in iron content. To assure that this water does not enter the city's reservoir, a system was devised to turn off the raw water diversion and restore the raw water pipeline to service after the water cleared up. An intake diversion dam on Castle Creek conducts the flow through a pipe line to a structure where a 30 in diameter butterfly valve is located. When the valve is closed, the flow passes over a weir and returns to the creek. When the valve is open, the water flows on through the pipe line to the water treatment plant some 2 miles away. This unit has an automatic alarm system that enables the operator to maintain a chemical dosage for a limited range of turbidities and also increases the length of filter runs. The raw water storage reservoir does not silt up as quickly and the net water production of the plant is greater. (Merritt-FIRL)
W74-08889

NEW ARIZONA WASTEWATER PLANT TO ALLEVIATE PROBLEMS,
Collins (John S.), and Associates, Tucson, Ariz.
E. Roll.
Water and Sewage Works, Vol 121, No 4, p 60, April, 1974.

Descriptors: *Reclaimed water, *Waste water treatment, *Treatment facilities, *Arizona, Equipment, Automation, Automatic control, Activated sludge, Biological treatment, Flow, Suspended solids, Biological oxygen demand, Costs, Measurement.
Identifiers: *Tucson(Ariz).

The Tuscon, Arizona $1.5 million waste water reclamation plant now under construction is described. The new, nearly constant flow (1,417 gpm) plant will have automatic sampling equipment, electronic metering and control, and will automatically record pH and chlorine residual levels. It will utilize automatic air injection and solids control for the aeration basin. The control building also has a small but efficient facility for on site laboratory analysis and an equipment maintenance shop. The activated sludge biological process will be used in handling an average flow of 1.5 mg/d and a peak of 2.0 mg/d. Influent to the reclamation system has 180 mg/liter of suspended solids and 200 mg/liter of biological oxygen demand. The cost of the operation is estimated at $84,293 per year of $154 per million gallons of reclaimed water produced. (Merritt-FIRL)
W74-08890

CHLORINE RESIDUALS IN TREATED EFFLUENTS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5C.
W74-08891

CORROSION-RESISTANT PIPE AT WALT DISNEY WORLD.
For primary bibliographic entry see Field 8G.
W74-08892

APPARATUS FOR AND PROCESS OF TREATING LIQUIDS WITH A GAS,
E. T. Armstrong.
U.S. Patent 3,805,481. Official Gazette of the U.S. Patent Office, Vol 921, No 4, p 1359, April 23, 1974. 1 fig.

Descriptors: *Gases, *Patents, *Liquids, *Mixing, Disinfection, Separation techniques, Equipment, Flow, Oxygen, Ozone, Flow, *Waste water treatment.
Identifiers: Sterilization, Bacterial reduction.

A gas-liquid mixing system for selective bacterial reduction, generalized disinfection sterilization or other gas treatment of the liquid is described. The system utilizes essential gravitational head and/or pumps in conjunction with a process flow line which may operate under a hydraulic pressure gradient. It has an inlet at one end for receiving the untreated liquid and an outlet at its opposite end, one or more local areas of high momentum exchange, and one or more injectors for the introduction of a gas into the process line. The injectors are located so as to introduce the gas into the liquid downstream from the areas of high momentum exchange where the static pressure is at least partially regained. The gas may consist of air, oxygen, or an oxygen ozone mixture, either alone or mixed with a carrier gas. (Merritt-FIRL)
W74-08896

RADIOACTIVE WASTE TREATMENT SYSTEM,
Nuclear Waste Systems Co., Campbell, Calif. (Assignee)
J. Mertens.
U.S. Patent 3,805,959. Official Gazette of the U.S. Patent Office, Vol 921, No 4, p 1483, April 23, 1974.

Descriptors: *Waste water treatment, *Patents, *Radioactive wastes, Solid wastes, Sludges, Resins, Storage tanks, Separation techniques, Percolation, Waste disposal.

A radioactive waste treatment system is described for solid radioactive process waste from nuclear reactor power plants. The wastes consist of filter sludges and demineralized resins or ion exchange resins. The wastes are moved to large tanks where they are collected. The backwash water and floor drain water wastes are percolated through settled solids by gravity. In doing so, the wastes are prefiltered and predemineralized. The waste waters are then polished in the water treatment system and returned to a condensate storage tank. (Merritt-FIRL)
W74-08897

SEWAGE AND WATER TREATMENT WITH MODIFIED QUARTERNARY SALTS OF VINYLPYRIDINE COPOLYMERS,
Philips Petroleum Co., Bartlesville, Okla. (Assignee)
R. C. Doss, and J. W. Cleary.
U.S. Patent 3,806,450. Official Gazette of the U.S. Patent Office, Vol 921, No 4, p 1604, April 23, 1974.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Salts, Coagulation, Filtration, Flocculation.
Identifiers: *Vinylpyridine, *Quarternary salts.

A sewage and water treatment system is described in which the sewage and water are chemically conditioned with modified quaternary salts of vinylpyridine copolymers. Coagulation, flocculation, and filtration in sewage and water treatment processes are significantly improved by the use of the salts. (Merritt-FIRL)
W74-08899

AUTOMATIC VALVES, PARTICULARLY FOR USE WITH FILTERS,
Engineering Components Ltd., Liverpool (England). (Assignee)
For primary bibliographic entry see Field 8C.
W74-08900

DEVICE FOR CONDUCTING WASTE LIQUID FROM A RECEPTACLE TO A PNEUMATIC LIQUID DISPOSAL SYSTEM,
Aktiebolaget Electrolux, Stockholm (Sweden). (assignee)
For primary bibliographic entry see Field 8A.
W74-08901

METHOD AND APPARATUS FOR REMOVING SOLIDS,
FMC Corp., San Jose, Calif. (assignee)
H. L. Pentz, C. Parkhani, and F. Majeron.
U.S. Patent 3,807,560. Official Gazette of the U.S. Patent Office, Vol 921, No 5, p 1908-1909, April 30, 1974. 1 fig.

Descriptors: *Separation techniques, *Patents, Equipment, *Bottom sediments, Settling basins, *Sludge treatment, *Waste water treatment.

A method and apparatus for removing a varying depth layer of settled solids from the bottom of a sedimentation tank is described. The apparatus includes a plurality of spaced eduction means supported on a bridge that is movable transversely between spaced inlets and outlets for the tank to remove settled solids from associated zones in the tank bottom. The apparatus provides a range of flow capacity between a minimum and maximum for each zone. The flow of sludge can be adjusted to remove all deposited solids from each zone during each pass of the bridge. A sensing mechanism maintains a substantially uniform solids concentration in the sludge being removed. (Merritt-FIRL)
W74-08902

FORT WORTH WATER SUPPLY AND TREATMENT PLANT DEDICATED.
Water and Sewage Works, Vol 12, No 4, p 46-47, 63, April, 1974. 5 fig.

Descriptors: *Design data, *Pumping station, *Treatment facilities, Pipelines, Reservoirs, Construction, *Waste water treatment, Chemical treatment, Water analysis, Taste, Odor, Sedimentation, Filtration, Filters, Pumps, Flocculation, *Texas.
Identifiers: *Fort Worth(Tex).

The dedication and design of the Cedar Creek Lake Pump Station and the Rolling Hill Water Treatment Plant of Fort Worth, Texas are described. The Cedar Creek project consists of the Cedar Creek Reservoir with a capacity of 678,000 acre-ft, the dam being about 85 mi southeast of Fort Worth; an intake pump station at the reservoir; a 72 in pipe line with appurtenant pump stations, 68.2 mi in length from the reservoir intake to a balancing reservoir at the end of the 72 in section of pipe line; an 84 in pipe line, 6.1 mi in length from the balancing reservoir to the site of the treatment plant; and the balancing reservoir with a capacity of 150 mil gal. Designed to handle 80 mgd, the $8.7 million Rolling Hills plant will be able to treat 100 mgd when transmission facilities permit. Expansion to 160 mgd will not require added chemical facilities, administrative or laboratory buildings, or high service pump stations. The 194 acre sites will allow expansion to 320 mgd. Plant design permits ultimate computer control with data logging. The water is treated for turbidity, taste, and odor control. Following chemical application proportional to flow, the water is mixed, coagulated, settled, filtered and stored for delivery. (Merritt-FIRL)
W74-08904

DESIGN OF FILTRATION PLANT FOR ROCKVILLE, CONNECTICUT,
Metcalf and Eddy, Inc., Boston, Mass.
For primary bibliographic entry see Field 5F.
W74-08910

TURBIDIMETERS MONITOR DUBAI FLOOD WATER.
For primary bibliographic entry see Field 7B.
W74-08913

METHOD FOR DRYING SLUDGE AND INCINERATING ODOR BODIES,
Atomic Energy Commission, Washington, D.C. (assignee)
F. R. Keller.
U.S. Patent 3,805,715. Official Gazette of the U.S. Patent Office, Vol 921, No 4, p 1421, April 23, 1974.

Descriptors: *Drying, *Patents, *Sewage sludge, *Odor, Control, *Incineration, Gases, Turbines, Equipment, Waste water treatment.
Identifiers: *Fluidized bed.

A process for drying sewage sludge and eliminating its odors is described. The sludge is dried in a fluidized bed dryer while the odors are eliminated by incinerating them in a fluidized bed incinerator. The hot exit gases from the incinerator are employed to preheat both the sewage sludge feed and the fluidizing air stream for the fluidized bed dryer. The dryer contains a heat exchanger submerged in the fluidized bed which provides the heat for drying from the low pressure exhaust steam exiting from an extraction turbine. The condensate and exhaust from the dryer heat exchanger are recycled to the incinerator heat exchanger for generation of high pressure steam. The output of the extraction turbine is used to drive air blowers for the two fluidized beds. The fluidized bed incinerator is fluidized with the stream of off gases and odor bodies from the fluidized bed dryer, the fuel value of the off gases and odor is effectively used in the incinerator where heat is generated by fuel combustion. (Merritt-FIRL)
W74-08915

SEWAGE FLOW CONTROL SYSTEM,
S. F. Smith.
U.S. Patent 3,805,817. Official Gazette of the U.S. Patent Office, Vol 921, No 4, p 1446-1447, April 23, 1974. 2 fig.

Descriptors: *Patents, *Sewage, *Flow control, Pipes, Stabilization, Flow rates, Groundwater, Waste water treatment, Pollution abatement, *Water pollution control.

A sewage flosw control system is described for a sewage piping complex. Flow stabilizing stations are mounted in a series of section, each including means for constricting and means for accelerating flow to maintain selected pressures and flow rates in the controlled sections. This process obtains maximum use of the cubical volume of the piping complex to maintain the piping full of fluid to provide overall even flows of sewage during both normal peak and low volume flows and sufficient internal piping pressure to inhibit ground water influx. (Merritt-FIRL)
W74-08916

RELATIONSHIP BETWEEN BOD REMOVAL AND LAS DETERGENT REMOVAL IN WASTEWATER TREATMENT SYSTEMS,
Puerto Rico Univ., Mayaquez. Dept. of Civil Engineering.
N.-H. Tang.
Available from the National Technical Information Service as PB-232 997; $3.75 in paper copy, $1.45 in microfiche. Puerto Rico Water Resources Research Institute, Mayaquez, Completion Report, May 1974. 57 p, 16 fig, 15 tab, 6 ref. OWRR A-035-PR(1).

Descriptors: *Waste water treatment, *Biochemical oxygen demand, *Detergents, *Linear alkylate sulfonates, Domestic wastes, *Biological treatment, Performance efficiencies, Activated sludge, Trickling filters, Chemical oxygen demand.
Identifiers: *BOD removal, Total organic carbon.

Traditionally, biological process efficiency is measured by its BOD removal. However, a period of 5 days is required to determine the BOD in wastewater. This is too long a period of time for process control. If the process is controlled by COD removal, much shorter time will be needed for determination. The complexity of today's sewage causes the ratio of biodegradable organics to nonbiodegradable organics in wastewater to change frequently; this changing nature, in turn, prevents meaningful uses of COD information. Information of TOC has the same problem as that of COD. In detergent., LAS (Linear Alkylate Sulfonate) is a basic organic element which is readily degraded in municipal biological processes. It is one of the many biodegradable organic compounds in wastewater. The fact that LAS can be rapidly determined within 30 minutes makes its use advantageous for process control. The relationship between BOD removal and LAS removal in biological processes, was studied. The results indicate that BOD removal and LAS removal in both activated sludge and trickling filter processes are significantly correlated. It is very likely that the % LAS removal of a biological process can be used to predict the % BOD removal of the same process.
W74-08939

EVALUATING WATER REUSE ALTERNATIVES IN WATER RESOURCES PLANNING,
Utah State Univ., Logan. Center for Water Resources Research.
A. B. Bishop, W. J. Grenney, R. Narayanan, and S. L. Klemetson.
Available from the National Technical Information Service as PB-232 996; $4.75 in paper copy, $1.45 in microfiche. Utah Water Research Laboratory, Publication No PRWG123-1, January 1974. 137 p, 42 fig, 28 tab, 39 ref, 8 append. OWRR B-075-UTAH(1). 14-31-0001-3941.

Descriptors: *Water reuse, *Waste water treatment, *Water supply, *Systems analysis, Linear programming, Optimization, Water costs, *Utah, Evaluation, *Alternative planning, Model studies.
Identifiers: Jordan River Basin(Utah), Salt Lake City(Utah).

Water reuse is a recognized option for augmenting water supplies to provide for expanded water needs. A methodology is developed for examining optimal strategies for water reuse within the context of the total water resources system, including both the provision of water supplies for various uses and management of wastewaters. A model of the water resources system is formulated as a 'transportation' or 'transshipment' problem in linear programming depicting the possible sources of supply, including effluent sources available for reuse, which can be used to satisfy the requirements of various water users. The optimizing objective in the model is to minimize the cost of meeting water supply requirements and of wastewater treatment to satisfy water quality standards. The Lower Jordan River Basin, which encompasses the Salt Lake City, Utah, metropolitan area, is used as a case study for applying and testing the model. Optimal allocations were obtained for low, middle, and high forecasts of future water requirements roughly corresponding to a fifty-year time horizon. Four alternatives for regional wastewater treatment were also analyzed considering possibilities for reuse. Assessment capabilities of the model include examining redistribution of supplies, time-staging of supplies and related treatment facilities, and analyzing sensitivity of allocations to changes in costs.
W74-08940

INDUSTRIAL WATER SOFTENER WASTE BRINE RECLAMATION,
Culligan, International Co., Northbrook, Ill.
J. Burton, and E. Kreusch.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-007, $1.95; microfiche from NTIS as PB-233 132, $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-74-007, February 1974. 158 p, 25 fig, 19 tab, 2 ref. EPA Project 12120 GLE.

Descriptors: *Water reuse, *Water softening, *Chemical precipitation, *Brines, Hardness(Water), Water pollution treatment lime, *Waste disposal, Brine disposal, Industrial water, Capital costs, Operating costs.
Identifiers: *Regenerant reuse, Lime soda softening, Regenerant disposal.

There are two alternatives for discharge of water softener regenerant brines to receiving streams: (1) truck to approved dumping site; (2) reclaim for reuse. Brine reuse has been studied at a central regeneration facility for portable water softeners. Reclamation used modified lime-soda softening for the waste brine to produce an acceptable regenerant brine. Regenerant wastes were reduced by 89% to produce an environmentally acceptable sludge. The process is feasible technically, marginal economically. The added costs for lime and soda ash are less than is the value of salt and water reclaimed by their use. That is, the process is cheaper chemically; however, equipment and labor costs negate this savings. Depreciation and operating costs were high at the test location: total costs favor trucking wastes to an approved dumping site. Capital and operating costs may be reduced under a new project following the report's recommendations. (EPA)
W74-08941

A PLANNED MAINTENANCE MANAGEMENT SYSTEM FOR MUNICIPAL WASTEWATER TREATMENT PLANTS,
EnviroPlan, Inc., College Park, Md. Fairfax County, Va.
D. H. Sargent, and D. A. Rudich.
Copy Available from GPO Sup Doc as EP1.23:600/2-73-004, $1.55; microfiche from NTIS as PB-233 111, $1.45. Environmental Protection Agency, Technology Series Report EPA-600/2-73-004, November 1973. 111 p, 31 fig, 16 tab, 20 ref. EPA Project 11010 GWI.

Descriptors: *Waste water treatment, Maintenance, *Management, *Scheduling, *Manpower, *Operation and maintenance, *Maintenance costs, Equipment, Mechanical equipment, Hydraulic equipment, Electrical equipment, Instrumentation, Warning systems, Control systems, *Treatment facilities.
Identifiers: Planned maintenance, Maintenance management, Preventive maintenance, Corrective maintenance, Maintenance procedures.

A Planned Maintenance Management System (PMMS) has been developed and successfully demonstrated at the 18-MGD Lower Potomac Plant of Fairfax County, Va., establishing a model maintenance management program for wastewater treatment plants throughout the United States. This PMMS provides for the specific maintenance needs of each item of plant equipment and reduces the maintenance of complex equipment to simple procedures. For each procedure the PMMS details the methods, materials, tools and personnel required; schedules the task; and provides for data recording and feedback. The success of this PMMS during the 12-month demonstration phase was measured by a steady downward trend in the malfunction of mechanical equipment. Incipient failures were detected in many cases and cor-

rective action was taken to avoid breakdowns. This report describes the PMMS in technical detail; discusses the installation of the PMMS, including acceptance by the mechanics and coordination with plant operations; and outlines the application of the PMMS to other wastewater systems. (EPA)
W74-08944

SULFURIC ACID AND FERROUS SULFATE RECOVERY FROM WASTE PICKLE LIQUOR,
Fitzsimons Steel Co., Youngstown, Ohio.
J. K. Seyler, W. E. Thornton, and M. K. Householder.
Copy Available from GPO Sup Doc as EP1.23:660/2-73-032, $1.20; microfiche from NTIS as PB-233 112, $1.45. Environmental Protection Agency, Technology Series Report, EPA-660/2-73-032, January 1974. 71 p, 16 fig, 22 tab, 8 ref. EPA Project 12010 FNM.

Descriptors: *Waste water treatment, *Industrial wastes, Sulfates, *Crystallization, Centrifugation, Chemical precipitation, Capital costs, Operating costs.
Identifiers: Sulfuric acid, *Spent pickle liquor, Ferrous sulfate heptahydrate, *Acid recovery, Chemical recovery.

This report describes the investigation of the process variables of a facility for the treatment of spent sulfuric acid pickle liquor. The process is based on the vacuum crystalization technique developed by Keram Chemie-Lurgi of Germany. It recovers ferrous sulfate heptahydrate as a nearly dry solid by-product and recovers the unreacted acid for recycle to the pickling tank thus eliminating the discharge of spent pickle liquor and rinse water. The full scale facility achieved acid recoveries equivalent to 21.2 tons/day of 12% sulfuric acid for recycle and an average of 115 lbs/hour of 99.56% FeSO4.7H2O by-product. Capital costs were $191,710 or $19,739/year based on a fifteen year life at 6% interest. Net operating costs were $42,320/year including a $21,400/year benefit from acid recovery. (No credit of $2,300/year of ferrous sulfate heptahydrate was included due to the nationwide excess production over market absorbing ability.) The total costs were $62,059/year, $1.75/ton of steel pickled, 0.614 cents/$ total sales, or $12.93/cubic meter of wastes treated. (EPA)
W74-08945

RADIATION HAZARDS FROM THE MISUSE OF URANIUM MILL TAILINGS,
Brandeis Univ., Waltham, Mass. Dept. of Biochemistry.
For primary bibliographic entry see Field 5C.
W74-08951

TRANSURANIC SOLID WASTE MANAGEMENT RESEARCH PROGRAMS -- QUARTERLY REPORT, JULY-SEPTEMBER 1973.
Los Alamos Scientific Lab., N. Mex.
Available NTIS, Sprifield, Va, as Rept No LA-5512-PR, $4.00/copy, $1.45/microfiche. Report LA-5512-PR, February 1974. 22 p, 4 fig, 4 tab, 1 append.

Descriptors: *Radioactive waste disposal, *Underground waste disposal, *Waste treatment, *Water pollution, *Water pollution sources, Soil contamination, Research and development, Research facilities, Waste storage, Safety, Assessment, Model studies, Geology, Hydrology, Meteorology, Groundwater, Sites.
Identifiers: *Burial grounds.

Progress during the period of July-September 1973 is reviewed for three transuranic solid waste management research programs funded by the AEC Division of Waste Management and Transportation. The three programs include transuranic solid waste management research and development, the contaminated waste treatment development facility, and the burial grounds evaluation. The interim storage criteria are now ready to be issued for general review. Experiments in radiolysis and container corrosion have been reorganized and expanded to provide information for optimization of interim storage, while waste sorting experiments have begun to determine more accurately the character of wastes being produced at LASL. Several task forces have been organized for the waste treatment facility to evaluate incinerators and determine a satisfactory operational size for the facility. Work has begun on developing a model for the risk analysis of radioactive burial grounds. A questionnaire has been developed to obtain the nessary information for the analysis. (Houser-ORNL)
W74-08963

QUARTERLY PROGRESS REPORT -- RESEARCH AND DEVELOPMENT ACTIVITIES WASTE FIXATION PROGRAM -- OCTOBER THROUGH DECEMBER 1973.
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
Available from NTIS, Springfield, Va, as Rept No BNWL-1809, $5.45 per copy, $1.45 microfiche. Report No BNWL-1809, January 1974. 90 p, A.M. Platt, Compiler, 29 fig, 12 tab.

Descriptors: *Radioactive waste disposal, *Waste treatment, *Wastte storage, *Research and development, Waste water(Pollution), Water pollution sources, Leaching, Ion transport, Transporation.
Identifiers: *Waste solidification, *Spray solidification, *Fluidized bed process, Vitrification, Calcination, Fixation, Vaporization.

Progress is reported in research and development activities in the field of radioactive waste fixation. In the area of development of spray calciner and inconel melter, the major considerations were melt agitation, filter differential pressure, and quench scrubbing of the off-gas. Operating parameters and results of development of spray solidification runs are given. Ceramic refractories are being tested in a high temperature waste glass to determine their compatibility for use in a ceramic-lined waste glass melter. Cost comparisons are made for improved heat transfer in radioactive waste canisters. Three oxide systems were examined to note effects of composition on leachability. Waste vaporization studies are made to investigate the behavior of fission product containing wastes. Attention is being given to helium incorporated in the pores of high level waste glasses which may possibly cause stresses similar to those of a small pressure vessel. Analysis of gas samples inside the canisters after storage showed helium and hydrogen below detectable limits. Some alternative waste fixation schemes are being studied. (Houser-ORNL)
W74-08965

THE ENDOTHERMIC PROCESS--APPLICATION TO IMMOBILIZATION OF HANFORD IN-TANK SOLIDIFIED WASTE,
Atlantic Richfield Hanford Co., Richland, Wash. Chemical Processing Div.
M. J. Kupfer, and W. W. Schulz.
Available from NTIS, Springfield, Va, as Rept No ARH-2800, $4.00/copy, $1.45/microfiche. Report No ARH-2800, July 1973. 31 p, 3 fig, 7 tab, 14 ref.

Descriptors: *Radioactive waste disposal, *Waste storage, *Waste treatment, *Leaching, *Soil water, Soil contamination, Penetration, Permeability, Porosity, Movement, Cesium, Strontium, Heat, Absorption, *Washington.
Identifiers: Vitrification, Waste burial, Endothermic, Richland(Wash).

Converson of high-level solid radioactive waste to a nonleachable silicate glass is accomplished in the Endothermic process by simple melting of a mixture of the waste with crushed basalt. Dense (2.5 g cm(-3)) green-black glasses are obtained by melting mixtures containing 30 to 40 wt% Hanford In-Tank Solidified (ITS) waste, 50 to 70 wt% basalt, and 0 to 10 wt% B2O3. Addition of B203 to the process charge is desirable to lower its melting range from about 1100-1150C to 1000-1050C. Leach rates of these glasses (calculated from the sum of the concentrations of Fe, Na, Ca, Si, Mg, Al, Sr, and Cs in the leach liquor) in water at 25C range from 10(-7) to 10(-5) g/cm sq day. The leach rate, based on Cs-137, of a typical Endothermic process glass made from actual ITS waste is 3.0 x 10(-8) g/cm sq day. This leach rate corresponds to removal of 2.1 x 10(-14) g Cs-137 per day from a square centimeter of glass containing 57 micro-Ci Cs-137 per gram. Judging from initial tests, the Endothermic process is a very promising scheme to increase immobilization of the ITS waste. (Houser-ORNL)
W74-08968

ORGANIC AND COLOR REMOVAL FROM WATER SUPPLIES BY SYNTHETIC RESINOUS ADSORBENTS,
Alaska Univ., College. Environmental Quality Engineering and Civil Engineering.
T. Tilsworth.
Available from the National Technical Information Service as PB-233 068, $3.75 in paper copy, $1.45 in microfiche. Alaska Institute of Water Resources, Fairbanks, Report No IWR-50, January 1974. 53 p, 16 fig, 2 tab, 29 ref. OWRR A-034-ALAS(1).

Descriptors: *Resins, Ion exchange, *Adsorption, Absorption, *Color, Activated carbon, Aesthetics, Filtration, *Waste water treatment, *Water treatment, Alaska, Water supply, *Organic matter.
Identifiers: Synthetic resinous adsorbents.

An experimental study was conducted to evaluate the effectiveness of synthetic resinous adsorbents for removing color and organics from water supplies. Four different resins were tested with water from three individual sources. The results show that synthetic resinous adsorbents were effective in removing color and organics. The effectiveness of the resins was dependent on their individual characteristics. In general, the resins performed best for moderate concentrations of color and organics. Relatively good color removal was achieved on the sewage treatment plant effluent. Some difficulty was encountered in treating the waters so that they would meet the color requirements for U.S.P.H.S. drinking water standards. The use of synthetic resinous adsorbents appears to hold promise for treatment of relatively small water supplies containing color and organics. The economics of such systems needs further evaluation.
W74-09050

APPLICATION OF REVERSE OSMOSIS TECHNOLOGY TO HAWAIIAN LOW QUALITY WATERS,
Hawaii Univ., Honolulu. Water Resources Research Center.
B.-J. Chang, R. H. F. Young, and J. C. S. Chou.
Available from the National Technical Information Service as PB-233 130, $3.75 in paper copy, $1.45 in microfiche. Technical Report No 73, November 1973. 54 p, 17 fig, 17 tab, 29 ref. OWRR A-036-HI(1). 14-31-0001-3811.

Descriptors: *Hawaii, *Waste water treatment, Treatment facilities, *Reverse osmosis, Groundwater, Water quality, *Pilot plants, *Desalination, Brackish water.
Identifiers: *Oahu(H.I.).

A study of the application of reverse osmosis technology to the treatment of Hawaiian low quality waters was conducted. The purpose was to investigate the technical and economical feasibility of utilizing reverse osmosis technology to renovate waste waters after varying degrees of

conventional treatment, and to desalt Hawaiian brackish groundwater from both basaltic and reef limestone aquifers. The experimental investigation of the technical feasibility of renovating waste water and desalting brackish groundwater was conducted with a small reverse osmosis pilot unit at four test sites on the island of Oahu. The operation of the reverse osmosis pilot unit in processing waste waters suffered from the problem of performance decline. However, the pilot unit's operation with brackish groundwater yielded promising results. In general, high rejections of total dissolved solids, refractory organics, nutrients, bacteria, and virus were accomplished by the unit. Two waste water reclamation schemes incorporating the reverse osmosis process were considered possible in Hawaii. Treatment expenditures of the two schemes were estimated at 97.8 cents and 103.2 cents per 1000 gallons of treated waste water. Based on a cost model developed for estimating desalting costs by reverse osmosis plants with spiral wound modules, product water costs in Hawaii were estimated at 83.7 cents, 63.4 cents, and 49.7 cents per 1000 gallons for 1, 10, and 50 mgd plants, respectively.
W74-09052

A PORTABLE DEVICE FOR MEASURING WASTEWATER FLOW IN SEWERS,
Hittman Associates, Inc., Columbia, Md.
M. A. Nawrocki.
Copy Available from GPO Sup Doc as EP1.23:600/2-73-002, $1.00; microfiche from NTIS as PB-233 142 $1.45. Environmental Protection Agency, Technology Series Report, EPA-600/2-73-002, January 1974. 53p, 19 fig, 5 tab, 8 ref. EPA Project 11024 EVF Contract 14-12-909.

Descriptors: *Flow Measurement, *Sewers, Development, Gages, *Fabricati Instrumentation, *Design criteria, Measurement, Pipes, *Waste water(Pollution).
Identifiers: *Capacitance, *Heat pulse velocity, Prototype Development.

A research and development program to develop a portable device which is capable of measuring wastewater flow in sewers was undertaken. This work consisted of an investigation of the theoretical approach to be used, laboratory investigations and experiments to develop design criteria, design and fabrication of two prototype units, and field testing and evaluation of these units. Measurement of the cross-sectional area of flow was done by the use of capacitor plates to sense the change in water level in the sewer pipe. The method selected to measure the velocity of the flow involved the timing of a heat pulse as it traveled down the pipe. Theoretical evaluations and laboratory experiments were performed to prove the mode of operation of the proposed gage. Two protype gages were fabricated. The overall accuracy of the final prototype was plus or minus 15 percent. The accuracy of the separate cross-sectional area measurements was within five percent. Cross-sectional area measurements were not affected by contaminants in the sewer. Scum deposits on the walls of the gage significantly and adversely affected the accuracy of the velocity readings. (EPA)
W74-09061

METALLIC RECOVERY FROM WASTE WATERS UTILIZING CEMENTATION,
American Brass Co., Westbury, Conn. Div. of Engineered Environments.
O. P. Case.
Copy Available from GPO Sup Doc as EP1.23:670/2-74-008, $0.85, microfiche from NTIS as PB-233 143 $1.45. Environmental Protection Agency, Technology Series Report, EPA-670/2-74-008, January 1974. 36 p, 10 fig, 5 tab, 12 ref. EPA Program Element 1BB-36 Grant No S-802254.

Descriptors: Pollution abatement, Chemical wastes, *Industrial wastes, Recycling, *Waste water treatment, Electrochemistry, Waste treatment, Copper.
Identifiers: Copper recovery, Hexavalent chromium reduction, *Electrochemical reduction, Electrochemical replacement, *Cementation(Electrochemical), Iron reductant, Particulate iron, Alkali earth metal-silicon alloys, *Metal finishing wastes, *Metal recovery.

Bench-scale experiments utilizing the 'cementation' reaction (ie electrochemical reduction by contact with a metal of higher oxidation potential) for the precipitation of copper and the reduction of hexavalent chromium in industrial waste streams were performed. Reductants included: soft iron shot 4.37 mm dia, particulate iron approximately -400 mesh and alkali earth metal-silicon alloys in granular form. Soft iron shot was found to be an effective reductant. Below pH 3.0 chromium reduction is rapid and quantitative. Copper cementation is slower and is influenced more strongly by oxygen, speed of mixing, and available iron surface. Previously deposited copper does not significantly impede further copper deposition. Copper catalyzes the chromium reduction. Particulate iron was not as satisfactory as the iron shot due to 'clumping' of the particles when they became coated with copper. Silicon alloys were effective for removal of copper, zinc and trivalent chromium, but not reliable for hexavalent chromium since the reaction is not primarily a reducing one. (EPA)
W74-09062

CHEMICAL/PHYSICAL AND BIOLOGICAL TREATMENT OF WOOL PROCESSING WASTES,
Metcalf and Eddy, Inc., Boston Mass.
L. T. Hatch, R. E. Sharpin, and W. T. Wirtanen.
Copy Available from GPO Sup Doc as EP1.23:660/2-73-036, $1.05; microfiche from NTIS as PB-233 137 $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-73-036, January 1974. 57 p, 18 fig, 22 tab, 20 ref. EPA Project 12130 HFX.

Descriptors: *Waste water treatment, Water quality control, Pollution abatement, Treatment facilities, *Industrial wastes, Pilot plants, Physicochemical properties, Activated sludge, *Biochemical oxygen demand, *Chemical oxygen demand, *Suspended solids.
Identifiers: *Wool scouring waste water, Chemically/Physically treated grease removal, Biological organic romoval, Temperature effects, *Acid-cracking treatment.

Elevated temperature acid cracking combined with pilot activated sludge and lagoon treatment were utilized to treat effluent wastewater from a woolen processing plant. Effluent from woolen 'top' (raw wool scouring) making is very high in biochemical oxygen demand (BOD), chemical oxygen demand (COD), and suspended solids (SS) (18,880 ppm, 60,600/ppm, and 37,600 ppm, respectively). The chemical/physical system consisted of a hot acid-cracking process to reduce the grease content in the influent to the biological system. Average grease reductions were from 13,400 milligrams per liter (mg/L) to 120 mg/L or 99 percent with a BOD reduction of 70 percent and COD reduction of 80 percent. The biological system consisted of a pilot extended aeration activated sludge unit with clarification and retention in a pilot facultative lagoon (53 days' retention). Typical BOD and COD reductions in the activated sludge/clarification unit were 83 percent and 54 percent, respectively, and in the lagoon 56 percent and 54 percent, respectively. (EPA)
W74-09064

TREATMENT OF SULFITE EVAPORATOR CENDENSATES FOR RECOVERY OF VOLATILE COMPONENTS,
Institute of Paper Chemistry, Appleton, Wis. Div. of Industrial and Environmental Systems.
K. W. Baierl, N. L. Chang, B. F. Lueck, A. J. Wiley, and R. A. Holm.
Copy Available from GPO Sup Doc as EP1.23:660/2-73-030, $2.10; microfiche from NTIS as PB-233 139 $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-73-030, December 1973. 168 p, 52 fig, 28 tab. EPA Program Element 1B2037 Grant S801207.

Descriptors: *Waste water treatment, *Evaporators, *Condensation, Activated carbon, Adsorption, Lignins, Solvent extractions, Separation techniques, *Distillation, Alcohols, Acids, Organic acids, Pulp wastes, *Pulp and paper industry, Biochemical oxygen demand, Chemical oxygen demand, Water pollution, Industrial wastes, Heat balance, Mass transfer, *Sulfite liquors.
Identifiers: Steam stripping, Fractional distillation, Spent sulfite liquor, Acetic acid, Methanol, Furfural, Ethyl acetate, Volatile acids, Neutral volatiles, Nonvolatile organics, Lignin, Lignosulfonic acids.

Pilot studies were conducted on two routes for recovery of volatile components in condensates from evaporation of spent liquors from acid sulfite pulping. The condensates were steam stripped prior to adsorption on activated carbon. The first route utilized fractional distillation and solvent extraction from the carbon, while the second route used low-temperature thermal regeneration. Relatively pure SO2, methanol, furfural, and ethyl acetate were recovered. Estimated process economy, based upon recovery of saleable volatiles, favorable mass and heat balances, and credits for BOD removal, indicates the first route may provide a favorable method for the removal of pollutants from condensates. Low temperature regeneration studies failed due to mechanical design problems, but this second route continues to be considered as technically feasible. In an important auxiliary study, a substantial number of condensate samples from cooperating mills were analyzed. Differences in quality, quantity, and dilution of the condensates from different sources were apparent. Individual design of processing facilities for each mill is indicated, and especially so in those mills where backwashing of the evaporators contaminate the condensate with nonvolatile materials. (EPA)
W74-09066

INVENTORY OF WASTE WATER PRODUCTION AND WASTE WATER RECLAMATION PRACTICES IN CALIFORNIA, 1970-1971,
California State Dept. of Water Resources, Sacramento.
C. F. Kleine, and W. B. Mitchell.
Bulletin No 68-71, November 1972. 35 p, 1 fig, 6 tab.

Descriptors: *Water reuse, *Reclaimed water, *California, Water supply, Census, Water sources, Sewage effluents, Waste water disposal, Irrigation, Tertiary treatment, Waste water treatment.

A summary of the status of municipal, industrial, and domestic waste water production and reclamation in California by local governmental units, federal institutions, and private enterprises is compiled for the years 1971-1972. About 175,000 acre-feet of water was reclaimed and reused out of a potential 2.3 million acre-feet of waste water according to 766 dischargers in 1970 compared to 190,000 acre-feet out of 2.5 million reported by 805 dischargers in 1971. Some 339,000 acre-feet in 1970 and 409,000 acre-feet in 1971 of treated municipal and industrial wastes were discharged into streams, lakes, reservoirs, and groundwater basins, thereby providing a readily available

urce of reusable water. Sewage systems produc- g less than 10 acre-feet annually and home mestic systems were not evaluated. The study, oken down into hydrologic units, shows the uthern Coastal and Tulare Basins as the largest claimers. While the Tulare Basin reclaimed 75% its waste water, the Southern Coastal Basin claimed 5%, comparable to other coastal areas. land, the majority of the waste water is either claimed or returned to freshwater sources for fu- re use. Over half of the waste water produced by e state, however, is lost through discharges into line waters. (Schroeder-Wisconsin)
74-09078

ASTE TREATMENT: UPGRADING OULTRY-PROCESSING FACILITIES TO EDUCE POLLUTION,
ffels Associates, Inc., Detroit, Mich.
nvironmental Protection Agency Technology ansfer Seminar Publication 3, July 1973. 48 p, 24 , 5 tab.

escriptors: *Waste water treatment, *Poultry, lanning, Industrial wastes, Florida, Treatment cilities, Design, Operation and maintenance, tes, Effluents, Lagoons.
entifiers: *Poultry processing wastes, Case his- ry, Gold Kist(Fla.).

ne quantity of waste water from poultry ocessing ranges from 5-10 gallon/bird and is typ- ally higher than domestic sewage in BOD. The itial planning requirements to implement waste- ater treatment in a poultry processing plant are scussed. Planning begins by identifying effluent urces and by examining local waste discharge andards. Secondary treatment processes evalu- ed include activated sludge, standard and high- te trickling filters, and aerobic and anaerobic goons. With the exception of anaerobic lagoons, ch of the above methods will achieve a 70-90% duction in BOD and 80-95% removal of spended solids. The major cost advantages for activated sludge and trickling-filter process are nstruction and land costs, while land utilization sts represent the major expense for lagoons. agoons represent the most prevalent poultry astes treatment process. The operating ocedures for treatment plants, providing daily, eekly, monthly, and yearly checklists are listed. case history of the Gold Kist Poultry Processing ant in Florida is analyzed. The plant was iginally designed for 50,000 birds/day per shift d has currently been expanded to 130,000 rds/day. Capital costs and operating cost per bird r the 1967 treatment plant was 0.1 and 0.06 nts/dressed pound. (Schroeder-Wisconsin)
74-09079

ESIGN AND OPERATION OF LAND TREAT- ENT SYSTEMS FOR MINIMUM CON- AMINATION OF GROUND WATER,
gricultural Research Service, Phoenix, Ariz. ater Conservation Lab.
. Bouwer.
round Water, Vol 12, No 3, p 140-147, May-June 74. 5 fig, 16 ref.

escriptors: *Waste water disposal, *Artificial charge, *Irrigation, *Water spreading, Ground- ater, Water reuse, Water conservation.
entifiers: *Land disposal(Wastes).

ow-rate or irrigation-type systems for land appli- tion of sewage effluent or similar waste water e often used in humid areas because they have a nall impact on the underlying groundwater. In id areas, low-rate systems cannot be used to oduce renovated water for groundwater charge, because the renovated water will have a uch higher salt content than the effluent. enovated water of relatively low salt content can nly be produced with high-rate systems. Such stems, which require permeable soil, can also be ed in humid areas to reduce the land require- ments. To minimize the impact of high-rate systems on groundwater quality, the system should be managed to remove as much of the pollutants (particularly nitrogen and phosphorus) as possible from the waste water as it seeps through the soil, and to restrict the spread of renovated waste water in the groundwater basin. Nitrogen removal can be maximized by stimulating dentrification in the soil. Certain soils can store large quantities of phosphate. The spread of renovated water in the groundwater can be controlled by intercepting the flow of renovated water with wells or drains for reuse or discharge into surface water. Techniques for predicting the underground flow system are presented. (Knapp-USGS)
W74-09089

PROTRACTED RECHARGE OF TREATED SEWAGE INTO SAND: PART I--QUALITY CHANGES IN VERTICAL TRANSPORT THROUGH THE SAND,
Rensselaer Polytechnic Inst. Troy, N.Y. Dept. of Environmental Engineering.
D. B. Aulenbach, T. P. Glavin, and J. A. Romero Rojas.
Ground Water, Vol 12, No 3, p 161-169, May-June 1974. 10 fig, 1 tab, 16 ref.

Descriptors: *Artificial recharge, *Waste water disposal, Water spreading, Lakes, Water pollution control, Water quality control, Filtration, Tertiary treatment, *Water reuse, New York.
Identifiers: *Lake George(N.Y.).

When the Lake George, New York, sewage treatment plant was put into operation in 1939, it was described as a complete treatment plant because the treated effluent is discharged onto sand seepage beds which are at least 25 feet deep. When beds were dosed, they were not saturated with water below 15 feet. Ten feet of sand removes coliforms by 99% and BOD by 96%. However, nitrates, phosphates, and chlorides remain in significant concentrations after filtration through 10 feet of sand. Phosphate removal in an infrequently used sand bed is greater than in a continuously used bed. (Knapp-USGS)
W74-09095

CONTROLLING POLLUTION,
Grove City Coll., Pa. Dept. of Economics.
H. F. Sennholz.
The Freeman, Vol 23, No 2, p 67-77, February 1973.

Descriptors: *Economic impact, *Industrial production, *Waste disposal, *Waste treatment, *Water pollution sources, Treatment facilities, Federal government, Planning, Long-term planning, Industrial wastes, Industrial water, Municipal wastes, Costs, Prices, Social impact, Water quality, Environment, Economics, Administration, Development, Management, Government finance, Natural resources, Sewage treatment, Sewage disposal, Waste water, Cost allocation, Pollutants.

Pollution is an example of failure of the private enterprise system. Private property and the profit motive are responsible for the ever-increasing quantities of wastes and effluents, and the by-products of production and consumption such as gases, solid or liquid wastes, heat and noise pollution and industrial effluents which overload the environment and are injurious to human, animal and plant life. Large blocs of 'externalities'--social costs not included in private costs, are destroying the physical environment according to economists. Almost 3 billion tons of residue are going back into the environment annually. Ad hoc taxes and government restrictions are not enough to cope with the growing problem. Central, or at least regional control is needed, as well as a new economics that considers waste disposal an integral part of the production and consumption process. The blame ultimately, is not laid on private businessmen, but on government itself rendering economic services in a primitive manner. According to a 1968 study by the Bureau of Solid Waste Management, only 64% of the nation's people lived in communities with refuse collection systems. (Silber-Florida)
W74-09128

OVER 40 YEARS OF REGIONAL SERVICES,
Hartford Metropolitan District, Water Bureau, Conn.
For primary bibliographic entry see Field 6E.
W74-09146

COUNTY SANITATION FACILITIES INSPECTION.
For primary bibliographic entry see Field 6E.
W74-09165

PROCESS FOR REMOVING OIL AND OTHER ORGANIC CONTAMINANTS FROM WATER,
Col-Mont Corp., Butte, Mont. (Assignee)
C. O. Bunn.
U. S. Patent No 3,798,158, 7 p, 3 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 920, No 3, p 871, March 19, 1974.

Descriptors: *Patents, *Oil pollution, *Organic wastes, *Waste water treatment, *Pollution abatement, *Oily water, Effluents, Activated carbon, Fly ash, Plastics, Specific gravity, Sewage treatment.
Identifiers: *Pollution prevention, Carbonaceous materials, Oil refineries, Activated charcoal, Polyethylene, Polypropylene.

A process and equipment are designed to treat the effluent from sewage treatment plants or oil refinery waste treatment facilities. Finely divided carbonaceous material is mixed with the effluent to be purified to form a slurry. The carbonaceous material may consist of finely divided coal, fly ash, powdered carbon, activated carbon or activated charcoal. The slurry is then influenced by specific gravity to stratify with the oil or organic material floating at the surface. The oil-enriched carbonaceous material is then mixed with a powdered plastic material. This mixture is then heated high enough to vaporize and thus strip the sorbed oil from the slurry. At such temperatures the plastic material is softened and adhesively binds the carbonaceous material forming a porous lightweight matrix material which is capable of floating on water. All or a portion of the mixture may be removed with a portion being available for recycling. (Sinha-OEIS)
W74-09175

METHOD FOR INSTALLING AERATION SYSTEMS IN SEWAGE TREATMENT TANKS,
Water Pollution Control Corp., Milwaukee, Wis. (Assignee)
P. M. Thayer.
U. S. Patent No 3,802,676, 4 p, 10 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 921, No 2, p 619, April 9, 1974.

Descriptors: *Patents, *Aeration, *Sewage treatment, *Waste water treatment, *Pollution abatement, *Water pollution control, *Water quality control, Equipment, Methodology.

A method of installing an aeration system in a sewage treatment tank includes the steps of prefabricating headers having transversely-extending connectors longitudinally spaced along the header. Next the connectors are threaded to receive air diffusers which support the header in a tank to extend horizontally therein. The position of support of the header is adjusted to obtain a desired uniform depth in the tank for the header. The header is leveled and rotated on its axis to level the connectors, and air diffusers are attached to the connectors. (Sinha-OEIS)
W74-09176

APPARATUS FOR EFFECTING PURIFICATION OF LIQUIDS BY FLOTATION,
Aktiebolaget Electrolux, Stockholm (Sweden). (Assignee)
S. E. A. Svantesson.
U. S. Patent No 3,799,345, 4 p, 3 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 920, No 4, p 1201, March 26, 1974.

Descriptors: *Patents, *Flotation, *Water purification, *Waste water treatment, *Water pollution treatment, *Pollution abatement, Equipment, Bubbles.

In the purification of liquids by flotation, a mixture of gas and liquid is subjected to sufficient pressure for the gas to dissolve in the liquid and form a solution of the gas and the liquid. The solution of gas and liquid without any substantial change in pressure is introduced at a low velocity to the body of polluted liquid in a flotation tank. Initially no gas bubbles are formed. As the solution rises slowly in the tank and it is subjected to a gradually lower pressure, gas bubbles are formed in a gentle manner. Due to the slow rate at which this takes place the gas bubbles will be very small. Since a great quantity of gas is dissolved in the liquid, a large quantity of gas bubbles will be formed. All of these factors contribute to an effective purification of polluted liquids by flotation. (Sinha-OEIS)
W74-09180

APPARATUS AND METHOD FOR TREATING SEWAGE,
R. Freese.
U.S. Patent No. 3,799,346, 8 p, 13 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 920, No 4, p 1202, March 26, 1974.

Descriptors: *Patents, *Pollution abatement, *Aeration, *Chlorination, *Sewage treatment, *Water pollution control, *Water quality control, Equipment Waste water treatment.

A primary waste receiving and mixing vessel is provided for receiving raw sewage and breaking down the larger pieces of raw waste to a suspension of small particles in a liquid. This suspension is pumped into a bottom region of an aeration vessel. A venturi aerator is provided on the outlet side of the pump for introducing air into the stream of sewage being pumped into the aeration vessel. The aeration vessel contains a series of downward inclined baffles which are arranged to trap pockets of air and to circulate the sewage along a tortuous path across these air pockets. A recycling system is provided to recycle a portion of aerated sewage from a top region of the aeration vessel back into the primary mixing vessel for mixing with the raw, unaerated sewage and a second recycling system is provided. A settling tank is provided for receiving aerated sewage and separating activated sludge from the liquid portion of the sewage. The liquid portions can be chlorinated and the separated activated sludge is returned to the aeration vessel for mixing with the aerated sewage. (Sinha-OEIS)
W74-09181

APPARATUS FOR CLEANING MUDDY WATER,
F. I. Stewart.
U.S. Patent No 3,799,349, 4 p, 4 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 920, No 4, p 1203, March 26, 1974.

Descriptors: *Patents, *Mud, *Sediment discharge, *Water treatment, *Water pollution control, *Pollution abatement, *Water quality control, Equipment, Separation techniques, Silt.

To remove mud, sediment or silt from a body of water, a conduit is provided. The conduit is perforated at the top to trap sediment. Within the conduit there is a flexible conveyor which can be moved through the conduit carrying the trapped sediment out of the conduit for disposal. (Sinha-OEIS)
W74-09182

FLOTATION APPARATUS,
Degremont Societe Generale d'Epuration et d 'Assainissement, Rueil-Malmaison (France). (Assignee).
V. Savall, and P. Treille.
U.S. Patent No. 3,799,350, 3 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 920, No 4, p 1203, March 26, 1974.

Descriptors: *Patents, *Water purification, *Flotation, *Waste water treatment, Equipment, Separation techniques, Bubbles.

A flotation apparatus comprises essentially a parallelepipedic tank disposed horizontally and provided along its major axis with open-top, pot-like injectors for the liquid to be treated with another liquid saturated with gas under pressure. The liquid to be treated is delivered through the bottom and preferably centrally of each injector, and the treatment liquid is supplied through a lateraleccentric but non-tangential pipe. Siphons are provided along the major side walls of the tank and are adapted, in conjunction with the injectors, to create outward and downward fluid flow passing under the siphons, other means being provided for removing the top sludge from one end of the tank. (Sinha-OEIS)
W74-09183

METHOD AND APPARATUS FOR FLOCCULATION OF DISSOLVED SUBSTANCES,
A. S. King.
U.S. Patent No 3,801,482, 3 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 921, No 1, p 300, April 2, 1974.

Descriptors: *Patents, *Nucleation, *Flocculation, *Waste water treatment, *Water pollution treatment, *Pollution abatement, *Water quality control, *Water treatment, Electrolysis.

The fluid to be treated is passed through an electrostatic field to neutralize particles within the fluid and initiate nucleation. The fluid is then subjected to electrolysis to increase nucleation and cause flocculation. Each treater has a metal outer shell which forms an outer electrode and an inner, tubular electrode which is concentrically disposed within the outer electrode. An annular treating region is located between an inlet and an outlet of the outer electrode. (Sinha-OEIS)
W74-09184

SEWAGE TREATMENT,
E. Luck.
U.S. Patent No 3,801,499, 6 p, 11 ref; Official Gazette of the United States Patent Office, Vol 921, No 1, p 304, April 2, 1974.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Pollution abatement, *Water pollution treatment, Alkalinity, Metals, pH, Bacteria, Fungi, Yeasts, Enzymes, Neutralization.

Various treatments are interrelated and are carried out so that a preceding treatment improves the capabilities of a succeeding treatment. The method of treating liquid sewage containing inorganic and organic components comprises adding an alkaline compound or a mixture of alkaline compounds, to precipitate out metals as insoluble carbonates, bicarbonates, hydroxides or oxides. The precipitates are easily removed. Sufficient alkaline material is added to raise the pH over 11 to destroy pathogenic and other bacteria. Enzymes from the bacteria are released into solution. Acid is added to lower the pH to 3.5 to 6.5. Bacteria, fungi or yeast are added to assist in decomposing organic components. After removing the dead organisms and other insoluble precipitates, the remaining liquid is neutralized. The neutralized liquid is then subjected to ion exchange to remove remaining unwanted ions. (Sinha-OEIS)
W74-09185

SYSTEM FOR TREATING DILUTE SLURRIES,
Westinghouse Electric Corp., Pittsburgh, Pa. (Assignee).
T. E. Lippert, C. D. Beristain, and M. Testa.
U.S. Patent No. 3,796,317, 4 p, 3 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 920, No 2, p 392, March 12, 1974.

Descriptors: *Patents, *Waste water treatment, *Pollution abatement, *Water pollution control, *Water quality control, Slurries, Equipment, Dewatering, Separation techniques.
Identifiers: *Pollution prevention.

A system for removing water from dilute slurries of the type discharged from waste water treatment plants, including feeding the dilute slurry into a reservoir and passing concentrically mounted endless screen and porous belts through the reservoir for absorbing water from the slurry is described. The water is squeezed from the belts and the thickened slurry is transported from the reservoir to a position for discharge onto the screen belt which moves in intimate contact with the porous belt. Such intimate contact facilitates further removal of water from the slurry by capillary action as the belts move linearly towards the end of the system. The belts then separate from each other. Water is squeezed from the porous belt and the screen belt with its slurry cake then runs through a pair of rollers for further slurry dewatering and compaction to a desired solids concentration. The dewatered slurry cake is then transferred to one of the rollers and subsequently removed from the system for ultimate disposal. (Sinha-OEIS)
W74-09188

WATER TREATING APPARATUS,
Union Tank Car Co., Chicago, Ill. (Assignee).
E. Salem.
U.S. Patent No. 3,796,319, 7 p, 2 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 920, No 2, p 392, March 12, 1974.

Descriptors: *Patents, *Water treatment, *Ion exchange, *Water purification, *Water quality control, Resins, Chemical reactions, Separation techniques, Anion exchange, Cation exchange.

Water is passed through a service layer of anion and cation exchange resins in a service zone. Then the water is passed through a leakage barrier layer of cation exchange resin. The anion exchange resin is regenerated in an anion regeneration zone, the cation exchange resin in a cation resin regeneration zone. A portion of the cation exchange resin is transferred to the service zone to establish a leakage barrier layer. The remainder of the cation exchange resin is mixed with the anion exchange resin, and the mixed resins are transferred to the service zone to establish a service layer of anion and cation exchange resins. (Sinha-OEIS)
W74-09189

APPARATUS FOR PROCESSING WATER,
Aktiebolaget Gustavsbergs Fabriker (Sweden). (Assignee).
P. E. Kosonen.
U. S. Patent No. 3,796,321, 3 p, 4 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 920, No 2, p 393, March 12, 1974.

Descriptors: *Patents, *Waste water treatment, *Phosphates, *Chemical precipitation, *Pollution abatement, *Water pollution control, *Water quality control, Potable water, Sedimentation.
Identifiers: Aluminum sulfate.

The apparatus comprises a first container in the form of a vertical cylinder to separate larger particles and a second container in the form of a vertical cylinder to separate precipitated particles. The second larger container surrounds the first container so that an annular gap is formed between the walls of the containers. There is a partition wall in the annular gap to form a channel for the supply of water from the first container to a precipitation zone in the annular gap on one side of the partition wall. The precipitate formed is deposited at the bottom of the gap during the passage of the water around the annular gap and the water thus treated passes through an outlet conduit on the other side of the partition wall. The invention specifically relates to the precipitation of phosphates in the waste water by the addition of aluminium sulfate. (Sinha-OEIS)
W74-09190

AERATION APPARATUS FOR LIQUIDS,
J. R. Kaelin.
U.S. Patent No. 3,796,417, 5 p, 2 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 920, No 2, p 417, March 12, 1974.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Aeration, Equipment, Activated sludge, Impellers.

An aeration impeller consists of two suction sides arranged above one another working in opposed directions. Guide channels connect each suction side with the discharge sides of the aeration impeller. The operation comprises the steps of arranging the aeration impeller in an aeration tank having a subsequently arranged settling tank of a sewage purification plant, and delivering activated sludge from the settling tank to one suction side of the aeration impeller. (Sinha-OEIS)
W74-09191

FEASIBILITY STUDY OF HYDROCYCLONE SYSTEMS FOR DREDGE OPERATIONS,
Oklahoma State Univ., Stillwater. Office of Engineering Research.
W. G. Tiederman, and M. M. Reischman.
Available from NTIS, Springfield, Va 22151 AD-766 212 as Price $5.25 printed copy; $1.45 microfiche. Army Engineer Waterways Experiment Station Contract Report D-73-1, July 1973. 176 p, 40 fig, 22 tab, 10 ref, 6 append. USCE Contract DACW 39-72-C-0050.

Descriptors: *Water pollution control, *Dredging, *Desilting, *Separation techniques, *Sediments, Sedimentation, Flocculation, Silting, Sediment control, *Waste water treatment.
Identifiers: *Hydrocyclones, Chemical treatment.

Hydrocyclone separators were tested for use in concentration and clarification of dredge spoil. The feasibility of using hydrocyclones for the recovery of sand and gravel while rejecting fine silt was also investigated. Six dredge spoil samples, two clay slurries, and one sand were used to determine the effect of particle size, viscosity of the fluid, and inlet solids concentration upon the effectiveness of the hydrocyclones. While the clarification and concentration performance of the hydrocyclones was good on clay slurries, the performance ranged from below average to poor on the spoil samples. The poor capability of the separators to clarify and to concentrate these spoils was due to the combination of high solids content, small particle sizes and highly pseudoplastic (high viscosity) behavior of the spoils. Centrifugation and chemical treatment were also ineffective. Spoils with solids contents less than 100 g/liter could be flocculated but the flocs were too fragile to survive in the hydrocyclones and neither clarification nor concentration was enhanced by the treatment. The high solids content affects clarification more than it does concentration; thus hydrocyclone concentrators were reasonably effective on all but the spoils of highest solids content. The hydrocyclone was very successful at recovery sand. The hydrocyclone system is recommended for this application of classifying the solids in dredge spoil. (Knapp-USGS)
W74-09202

TRACE METALS IN EFFLUENTS FROM METALLURGICAL OPERATIONS,
Battelle Columbus Lab., Ohio.
J. B. Hallowell, R. H. Cherry, Jr., and G. R. Smithson, Jr.
In: Cycling and Control of Metals; Proceedings of Environmental Resources Conference, October 31-November 2, 1972, Columbus, Ohio: Environmental Protection Agency National Environmental Research Center, p 75-81, February 1973. 4 fig, 10 tab, 3 ref.

Descriptors: *Trace elements, *Water pollution control, *Industrial wastes, *Mine wastes, Wastewater treatment, Ion exchange, Oxidation, Evaporation, Biodegradation.

The current pollution control techniques associated with metallurgical operations are listed, and some examples of data describing the behavior of trace metals in waste streams from smelting operations are given. Two basic and relatively long-term approaches to control of pollution by waste streams are modification of processes to minimize or eliminate the waste stream, and segregation of waste streams to minimize the volume to be treated, to allow the use of a specific treatment method, and to maximize the effectiveness of the treatment. The modification of processes generally involves the time and cost associated with research, development, and equipment changes, while the segregation of waste streams usually involves alteration of existing plant facilities. The standard methods of separating suspended solids from liquid waste streams and particulates from gas streams are listed. (See also W74-09206) (Knapp-USGS)
W74-09212

POLLUTION ABATEMENT IN THE METAL FINISHING INDUSTRY,
Environmental Protection Agency, Edison, N.J.
J. Ciancia.
In: Cycling and Control of Metals; Proceedings of Environmental Resources Conference, October 31-November 2, 1972, Columbus, Ohio: Environmental Protection Agency, National Environmental Research Center, p 83-90, February 1973. 3 fig, 5 tab, 17 ref.

Descriptors: *Water pollution control, *Trace elements, *Industrial wastes, *Metallurgy, Waste treatment, Water reuse, Air pollution.
Identifiers: *Metal finishing.

The wastes produced in metal finishing facilities come mainly from the following sources: the dumping of spent baths; the rinse waters used to wash off process solutions; and accidental waste discharges. Other sources of waste include plant and equipment cleanup, entrainment of mists in exhaust ventilation ducts, regenerants from ion exchange units, and sludges resulting from deposits in process tanks and the precipitation of contaminants from wastes. The methods available for the abatement of pollution may be divided into two general categories: in-plant control techniques for conserving water and eliminating all unnecessary wastes, and the installation of treatment and recovery processes to destroy or remove toxic and objectionable materials in the effluent. (See also W74-09206) (Knapp-USGS)
W74-09213

CONTROL AND PREVENTION OF MINE DRAINAGE,
Environmental Protection Agency, Cincinnati, Ohio.
R. D. Hill.
In: Cycling and Control of Metals; Proceedings of Environmental Resources Conference, October 31-November 2, 1972, Columbus, Ohio: Environmental Protection Agency National Environmental Research Center, p 91-94, February 1973. 4 tab, 12 ref.

Descriptors: *Water pollution control, *Heavy metals, *Mine drainage, Acid mine water, Mine water, Mine acids, Mine wastes, Water pollution sources, Water pollution treatment, Trace elements, *Reverse osmosis, *Waste water treatment.

Polluted mine drainage occurs not only from the mine itself, but also from waste dumps and tailings areas. The ultimate solution to the mine drainage problem is preventing its formation. The reaction is dependent on air (oxygen) and water coming in contact with sulfides. All prevention techniques are based on excluding water and air from the mining environment. Several methods are available to treat the mine drainage that cannot be prevented. The most commonly used method for treating acid mine drainage and removing heavy metals is neutralization. Various ion exchange schemes have been applied to the treatment of coal acid mine drainage. Reverse osmosis (R.O.) also removes multivalent ions from mine drainage. With the use of electrodeposition processes, several metals, such as copper and iron, can be removed from mine drainage. The metal is deposited on the cathode of an electric cell from which it can subsequently be recovered. (See also W74-09206) (Knapp-USGS)
W74-09214

HIGH-RESOLUTION ANALYSES OF REFRACTORY ORGANIC CONSTITUENTS IN AQUEOUS WASTE EFFLUENTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-09226

5E. Ultimate Disposal Of Wastes

HOUSEHOLD WASTEWATER CHARACTERIZATION,
Baxter and Woodman, Inc., Crystal Lake, Ill.
For primary bibliographic entry see Field 5B.
W74-08770

THORIUM ISOTOPE CONTENT IN RIVER WATER IN JAPAN,
Meteorological Research Inst., Tokyo (Japan).
For primary bibliographic entry see Field 5B.
W74-08772

CONTENT OF PLUTONIUM IN RIVER WATER IN JAPAN,
Meteorological Research Inst., Tokoyo (Japan).
For primary bibliographic entry see Field 5B.
W74-08821

LAND APPLICATION OF PROCESSED ORGANIC WASTES,
Ministry of the Environment, Toronto (Ontario). Waste Management Branch.
For primary bibliographic entry see Field 5D.
W74-08862

THE BALANCE BETWEEN WASTE TREATMENT AND WASTE DISCHARGE IN THE U.S., 1957-2000,
Monash Univ., Clayton (Australia). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 5D.
W74-08868

INDUSTRIAL WATER SOFTENER WASTE BRINE RECLAMATION,
Culligan, International Co., Northbrook, Ill.
For primary bibliographic entry see Field 5D.
W74-08941

STORAGE AND DISPOSAL OF HIGH LEVEL WASTES,
Brandeis Univ., Waltham, Mass. Dept. of Biochemistry.
For primary bibliographic entry see Field 5C.
W74-08948

THE INFLUENCE OF LIQUID WASTE DISPOSAL ON THE GEOCHEMISTRY OF WATER AT THE NATIONAL REACTOR TESTING STATION, IDAHO: 1952-1970,
Geological Survey, Idaho Falls, Idaho. Water Resources Div.
For primary bibliographic entry see Field 5B.
W74-08962

QUARTERLY PROGRESS REPORT -- RESEARCH AND DEVELOPMENT ACTIVITIES WASTE FIXATION PROGRAM -- OCTOBER THROUGH DECEMBER 1973.
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
For primary bibliographic entry see Field 5D.
W74-08965

NUCLEAR REACTIVITY EVALUATIONS OF 216-Z-9 ENCLOSED TRENCH.
Atlantic Richfield Hanford Co., Richland, Wash. Research Dept.
For primary bibliographic entry see Field 5A.
W74-08966

THE ENDOTHERMIC PROCESS--APPLICATION TO IMMOBILIZATION OF HANFORD IN-TANK SOLIDIFIED WASTE,
Atlantic Richfield Hanford Co., Richland, Wash. Chemical Processing Div.
For primary bibliographic entry see Field 5D.
W74-08968

DESIGN AND OPERATION OF LAND TREATMENT SYSTEMS FOR MINIMUM CONTAMINATION OF GROUND WATER,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5D.
W74-09089

PROTRACTED RECHARGE OF TREATED SEWAGE INTO SAND: PART I--QUALITY CHANGES IN VERTICAL TRANSPORT THROUGH THE SAND,
Rensselaer Polytechnic Inst. Troy, N.Y. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5D.
W74-09095

5F. Water Treatment and Quality Alteration

DEEP-BED FILTRATION,
BAMAG Verfahrenstechnik G.m.b.H., Butzbach (West Germany).
H. Jung, and E. S. Savage.
Journal of American Water Works Association, Vol 66, No 2, p 73-78, February, 1974. 10 fig, 2 tab, 5 ref.

Descriptors: *Design standards, *Filtration, *Filters, Potable water, *Water treatment, Waste water treatment.
Identifiers: *Germany, Deep bed filters, Backwash.

The advantages and disadvantages of deep bed filters which are utilized in Europe and other parts of the world are illustrated. Their chief advantage is their high specific loading. They make possible long filter runs and more finished water per wash than do shallower systems. They need less backwash water than do other systems. In some cases pretreatment can be reduced or eliminated. A disadvantage of deep bed systems is that deeper filter vessels are required which may preclude using such a system. In general, the trend is toward the deeper vessels because they avoid negative head loss in the filters at the end of each cycle. With deep beds and air water backwash, coarse media and low head loss filter bottoms may be used. The overall head loss is no more than generally experienced with shallower filters and in many cases may be less. Special consideration should be given to deep bed systems for process and potable water filtration when filter optimization is desired or the quantity of backwash water generated must be held to a minimum. (Merritt-FIRL)
W74-08784

HERE AND THERE.
For primary bibliographic entry see Field 5D.
W74-08785

DIRECT FILTRATION: AN ECONOMIC ANSWER TO A CITY'S WATER NEEDS,
Springfield Municipal Water Works, Mass. Water Dept.
For primary bibliographic entry see Field 5D.
W74-08788

PHOSPHATE REMOVAL BY MAGNETIC FILTRATION,
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
For primary bibliographic entry see Field 5D.
W74-08789

CITY OF BRADFORD WATER DEPARTMENT, CHELLOW HEIGHTS TREATMENT PLANT.
Water and Waste Treatment, Vol 16, No 11, p 21-22, November, 1973. 3 fig.

Descriptors: *Water treatment, *Filtration, *Reservoirs, Filters, *Treatment facilities.
Identifiers: *United Kingdom.

The Chellow Heights water treatment plant is discussed. A filter building was constructed to replace, with a higher capacity, the existing outmoded filters. Also a new precipitation tank increases existing precipitation capacity. Maximum throughput was designed to be 40 mgd (1.60 cu m/sec). A covered service water reservoir is currently under construction and has a capacity of 140,000 cu m (30.8 mg). It is based on the prime elements of reinforced concrete walls, reinforced concrete columns, and a reinforced concrete roof. (Merritt-FIRL)
W74-08795

UNIVERSITY CREDITS FEEDWATER TREATMENT PROGRAM FOR 50% CUT IN BOILER CLEANING WORK LOAD.
For primary bibliographic entry see Field 8G.
W74-08797

STARTUP AND OPERATION OF THE ROCKVILLE WATER TREATMENT PLANT,
Rockville Water and Aqueduct Co., Conn.
J. R. McQueen.
Journal of the New England Water Works Association, Vol 88, No 1, p 25-31, March, 1974.

Descriptors: *Treatment facilities, *Operation, Costs, Water quality, Water purification, *Waste water treatment, Iron, Activated carbon, Odor, Taste, *Connecticut, *Water treatment.
Identifiers: Manganese, Rockville(Conn).

The startup and operation of the Rockville Water Treatnt Plant is described. The plant is the result of 2 1/2 yr of planning and $2 1/4 million. Treatment in Rockville prior to this rapid sand filter plant consisted of chlorination which began in 1929, the addition of caustic soda in 1966 for corrosion control within the distribution system, and fluoridation required by state law in 1968. Complete startup toalok 18 days. On May 1, 1970 raw water began flowing through the plant and discharging back in Lake Shenipsit through the overflow piping of one of the clear water storage tanks. This was followed by chemical treatment stabilization, Board of Health inspections, and some piping changes. Five operators work a rotating shift schedule which requires that each operator would be involved in all aspects of the plant's operation and maintenance. The plant has effected a great improvement in water quality delivered to the system. Water color at the plant has been reduced from 10-30 to 2 units or less. Iron and manganese have been removed. Continuous activated carbon treatment has removed undesirable tastes and odors from the water. (Merritt-FIRL)
W74-08872

FORT WORTH WATER SUPPLY AND TREATMENT PLANT DEDICATED.
For primary bibliographic entry see Field 5D.
W74-08904

DESIGN OF FILTRATION PLANT FOR ROCKVILLE, CONNECTICUT,
Metcalf and Eddy, Inc., Boston, Mass.
A. Gammon.
Journal of the New England Water Works Association, Vol 88, No 1, p 19-24, March, 1974.

Descriptors: *Filtration, *Treatment facilities, *Design, Reservoirs, *Flexibility, Chemical treatment, Water purification, Pumping station, Buildings, Flocculation, Filters, Oxidation lagoons, Sludge disposal, Sludge storage, *Waste water treatment, *Connecticut.
Identifiers: *Rockville(Conn).

The design of a rapid sand filtration plant for the Shenipsit Lake Reservoir in Rockville, Connecticut is described. Due to the variations in raw water characteristics such as temperature from winter to summer, color, tastes, and odors, flexibility of chemical treatment was an important design consideration. The new low lift pumping station houses two 7.5 mgd vertical turbine pumps with space to permit the future installation of a third unit. The operations building houses all chemical storage and feeding equipment, with the exception of chlorine gas and sodium hydroxide. Each of the two treatment units has a flocculating compartment, a settling compartment, and a filtering compartment, all arranged concentrically with a 65 ft diameter circular tank. Lagoons were built to handle the waste water from filter backwashing, with sufficient volume to allow freezing of the sludge for ease in handling and disposal. (Merritt-FIRL)
W74-08910

ORGANIC AND COLOR REMOVAL FROM WATER SUPPLIES BY SYNTHETIC RESINOUS ADSORBENTS,
Alaska Univ., College. Environmental Quality Engineering and Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-09050

OVER 40 YEARS OF REGIONAL SERVICES,
Hartford Metropolitan District, Water Bureau, Conn.
For primary bibliographic entry see Field 6E.
W74-09146

PUBLIC WATER SUPPLY, SEWERAGE AND SOLID WASTE DISPOSAL SYSTEM.
For primary bibliographic entry see Field 6E.
W74-09156

POLLUTION CONTROL FACILITIES.
For primary bibliographic entry see Field 6E.
W74-09158

PURE WATER SUPPLY DEVICE,
H. Nishizawa.
U.S. Patent No. 3,799,344, 3 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 920, No 4, p 1201, March 26, 1974.

Descriptors: *Patents, *Water supply, *Ion exchange, Equipment, Water purification, Water treatment.

An electromagnetic valve is interposed in a feed pipe that supplies untreated water and that connects with an ion exchange type pure water producing device. A conductivity detector and a flow passage change-over mechanism including a three-way cock are respectively incorporated and serially connected. A float moves vertically according to the water level in the pure water tank. Its movement is conveyed to a float switch by means of a connecting rod. The float switch is operatively connected to an electric circuit. When the float switch is closed, the electromagnetic valve opens and the feeding of water to the pure water producing device is effected to begin and the pure water is supplied to the pure water tank. (Sinha-OEIS)
W74-09192

CHEMICAL COMPOSITION OF WATER SUPPLIES TO NAVAL AND MARINE CORPS AIR STATIONS,
Naval Air Development Center, Warminster, Pa. Materials Engineering Section.
For primary bibliographic entry see Field 5A.
W74-09227

5G. Water Quality Control

THE RECOVERY OF STREAM MACROBENTHIC COMMUNITIES FROM THE EFFECTS OF ACID MINE DRAINAGE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-08701

MAN-MADE LAKES: THEIR PROBLEMS AND ENVIRONMENTAL EFFECTS,
For primary bibliographic entry see Field 4A.
W74-08747

LAKE MEAD, A CASE HISTORY,
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 4A.
W74-08748

SANITARY IMPLICATIONS OF SMALL BOAT POLLUTION IN AN ATLANTIC ESTUARY,
Adelphi Univ., Garden City, N.Y. Inst. of Marine Science.
J. Cassin, K. Smith, and K. Frenke.
Environmental Letters, Vol 2, No 2, p 59-63, 1971. 2 tab, 2 ref.

Descriptors: *Coliforms, *Navigation, *Legislation, *Shellfish, Recreation, Recreation wastes, Boats, Boating regulations, Waste disposal, Pollution.
Identifiers: New York.

The implications of a New York navigational law forbidding sewage discharge by small pleasure craft into the water were investigated. The study indicates that coliforms increase in water column and shellfish in direct relation to small boat population in three of four recreational areas sampled. (Merritt-FIRL)
W74-08771

ORGANIC MANAGEMENT REDUCES LEACHING OF NITRATE,
H. H. Koepf.
Bio-Dynamics, No 108, p 20-30, Fall, 1973. 4 tab.

Descriptors: *Nitrates, *Farm wastes, Investigations, Fertilizers, *Soils, Drainage, *Leaching, Silts, Loam, Runoff, *Illinois.
Identifiers: Organic management, *Waste management.

The reduction of nitrate leaching by the application of organic manuring fluids was investigated and compared with adjacent areas under orthodox commercial farming. The nitrate concentration in the tile drainage runoff was determined in four fields in Buffalo, Ill., from 1969-1973. The average monthly nitrate concentration is tabulated when there was a runoff from the tiles. It is concluded that fertilizing with commercial nitrogen interferes with the changes which the nitrogen continuously undergoes in the soil. The drainage outlets in the soils under investigation are rather close to the surface. Although in these silt loams it might take several months before water from the surface arrives at the depth of these tiles, the tests showed that the biological soil processes are a crucial factor which determines nitrate leaching. The cycles of mobilization-immobilization, nitrate supply for the crops, etc., seem to be different in soils under organic management from those in soils treated chemically. (Merritt-FIRL)
W74-08773

CRITIQUE OF WATER POLLUTION CONTROL ACT,
British Columbia Univ., (Vancouver). Westwater Research Centre.
A. H. J. Dorcey, and I. K. Fox.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE1, p 141-151, February 1974. 1 tab, 3 ref.

Descriptors: *Federal Water Pollution Control Act, Standards, *Planning, Future planning(Projected), Water quality, *Water quality standards, Water management(Applied), *Canada.

The approach adopted in the Federal Water Pollution Control Act Amendments of 1972 is discussed. Specifically examined are the procedures envisioned to apply nationwide whereby: effluent and ambient standards are to be established and enforced; basin, state, and regional plans are to be developed; and water quality management facilities are to be financed. It is concluded that Congress may not be the best representative body to make some of the judgments that were made in the legislation; the enormous bureaucracy required by the legislation to achieve national objectives and to plan and implement water quality management programs is not necessary; and the effectiveness of the grant program is questionable. (Merritt-FIRL)
W74-08774

AMERICAN RIVER PLANT ADDS AUTOMATED PUMPING STATION.
For primary bibliographic entry see Field 8C.
W74-08780

DEVELOPMENT TRENDS IN POLLUTION-FREE PROCESSES.
For primary bibliographic entry see Field 5D.
W74-08783

ASPECTS OF WATER POLLUTION IN FERTILISER INDUSTRY,
Central Public Health Engineering Research Inst., Nagpur (India).
For primary bibliographic entry see Field 5C.
W74-08791

INTERACTION EFFECTS OF BORON AND LIME ON BARLEY,
Department of Agriculture, Charlottetown, (Prince Edward Island). Research Station.
For primary bibliographic entry see Field 3F.
W74-08799

RESPONSE OF SUBIRRIGATED HAY MEADOWS TO THE APPLICATION OF NITROGEN, PHOSPHORUS, AND SULFUR,
Nebraska Univ., Concord. Northeast Station.
For primary bibliographic entry see Field 3F.
W74-08802

ENVIRONMENT: A BIBLIOGRAPHY OF SOCIAL SCIENCE AND RELATED LITERATURE.
Michigan State Univ., Lansing.
For primary bibliographic entry see Field 10D.
W74-08824

COMPREHENSIVE MANAGEMENT OF PHOSPHORUS WATER POLLUTION,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5C.
W74-08826

ENVIRONMENTAL MANAGEMENT AND LOCAL GOVERNMENT,
International City Management Association, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-08827

PROMOTING ENVIRONMENTAL QUALITY THROUGH URBAN PLANNING AND CONTROLS,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
E. J. Kaiser, K. Elfers, S. Cohn, P. A. Reichert, and M. M. Hufschmidt.
Environmental Protection Agency, Socioeconomic Studies Series Report EPA-600/5-73-015, February 1974. 441 p, 17 fig, 20 tab, 360 ref.

Descriptors: *Comprehensive planning, *Planning, Non-structural alternatives, Social aspects, *Environmental effects, Land use, Air pollution, Regulation, Legal aspects, Local governments, *Urbanization, Urban hydrology, Zoning.
Identifiers: *Environmental quality, *Urban guidance systems, Noise.

The study focuses on the changing awareness and current practices in promoting environmental quality through urban planning and controls in local and metropolitan planning agencies. It includes a review of planning practices in the 1960's related to environmental quality; the results of a survey of urban planning agencies with regard to current planning for environmental quality; and a detailed examination of numerous planning approaches and controls considered to be promising for future environmental quality enhancement. The principal areas of concern are land use and comprehensive urban planning, water resource management and urban land-water interfaces, urban design, and the management of air quality and noise. The key concept of integration for the study is the urban guidance system approach which includes various planning activities, deci-

sion guides such as plans and policy statements, and action instruments such as ordinances, taxes, and public investments. An attempt is made to distinguish between the typical or mainstream planning approaches and controls and those which are new and innovative and therefore appear to have greater potential for promoting environmental quality in the future. Specifically within the water resource management area, the study focuses on two basic types of urban-water interfaces where promising approaches are taking place: those such as watersheds, wetlands, and floodplains where urbanization is taking place and transforming the nature of the water resource; and those such as urban sewerage and drainage systems where urban development has already occurred. (EPA)
W74-08828

ANALYSIS OF POLLUTION CONTROL COSTS,
Baker (Michael), Jr., Inc., Beaver, Pa.
F. J. Doyle, H. G. Bhatt, and J. R. Rapp.
Copy Available from GPO Sup Doc as EP1.23:670/2-74-009, $3.20; microfiche from NTIS as PB-233 026, $1.45. Environmental Protection Agency Technology Series Report EPA-670/2-74-009, February 1974. EPA Project 14010 HQC.

Descriptors: *Coal mine wastes, *Mine drainage, Wastes, Subsidence, Mining, Air pollution, Solid wastes, Erosion control, Sedimentation, Pennsylvania, West Virginia, Maryland, *Waste treatment, *Costs, Water pollution control.
Identifiers: *Pollution control costs, *Monongahela River Basin, Mine sealing, Refuse piles.

This report fulfills requirements for an effective, workable handbook on pollution control costs and factors effecting these costs for the Monongahela River Basin. The information is based on the latest technological developments and cost analyses of recent reclamation projects. Although the report was developed for the Monongahela River Basin study, the cost estimates and supporting data should prove useful for all of Appalachia and other areas with similar topography, mine drainage pollution problems and mining history. Specific areas covered are surface mines, refuse piles, mine sealing, mine drainage treatment, air pollution control, solid waste handling and disposal, abondoned automobiles, and erosion and sedimentation control. (EPA)
W74-08829

PHOSPHORUS REMOVAL DESIGN SEMINAR, CONFERENCE PROCEEDINGS NO. 1.
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5D.
W74-08846

A TANNER LOOKS AT THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972,
Widen (R. J.) Co., North Adams, Mass.
W. L. Smith.
The Journal of the Leather Chemists Association, Vol 69, No 4, p 157-174, April, 1974. 3 fig.

Descriptors: *Legislation, *Sewage treatment, *Effluents, *Costs, *Tannery wastes, Municipal wastes.
Identifiers: Federal Water Pollution Control Act, Sewage treatment plant.

Costs and technical requirements as ramifications of the new water pollution control law must be considered by the individual tanner at his plant. This is essential when discharging into an existing municipal sewage treatment plant or in planning a tie into a proposed municipal system. Treatment of effluents by the individual tanner is discussed. (Prague-FIRL)
W74-08863

STREAM STANDARDS: DEAD OR HIDING,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
M. G. Wolman.
Journal of the Water Pollution Control Federation, Vol 46, No 3, p 431-437, March 1974. 6 ref.

Descriptors: Rivers, *Streams, *Stream pollution, *Water quality standards, Water pollution, Costs, Dissolved oxygen, Dissolved solids, Turbidity, Pollutant identification.
Identifiers: *Stream standards, Biological measures, Standard parameters.

Water quality is not easily quantifiable, but is rather dependent upon perception of use. While the public is attuned to attributes such as algae, murkiness, suds, foam, cans, glass, and debris, scientists try to measure river quality by standard parameters such as dissolved oxygen, acidity, temperature, dissolved solids, turbidity, and biological measures such as the diversity of species, size of the population, and complexity of the system. To translate quality objectives into standards is quite difficult. In addition, economic benefits, as opposed to costs, are vaguely defined. Every water body has more than one polluter along with a number of pollutants, and reasonable standards must vary with perceived use of a particular river. (Prague-FIRL)
W74-08866

ENVIRONMENTAL TECHNOLOGY AT NORWICH UNIVERSITY,
Norwich Univ., Northfield, Vt. Dept. of Engineering and Technology.
For primary bibliographic entry see Field 6G.
W74-08871

RADIOLOGICAL ENVIRONMENTAL MONITORING--THE EPA APPROACH,
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-08877

TRENT-WITHAM-ANCHOLME SCHEME AND PROJECT OF THE LINCOLNSHIRE RIVER AUTHORITY,
Lincolnshire River Authority (England). Water Resources Dept.
For primary bibliographic entry see Field 6E.
W74-08882

DEVELOPMENT AND FUTURE OF DREDGING,
Corps of Engineers, Atlanta, Ga. South Atlantic Div.
A. W. Mohr.
Journal of the Waterways Harbors and Coastal Engineering Division, American Society of Civil Engineers, Vol 100, No WW2, p 69-84, May, 1974. 4 tab.

Descriptors: *Water quality, *Dredging, *Equipment, Ecological balance, Channels, Costs.
Identifiers: *Hydraulic dredges, *Mechanical dredges, Waterway maintenance.

Dredging is performed either to gain the bottom material for fill or commercial use or to create and maintain waterways. This paper is concerned with the latter case, where the material itself is an unwanted by-product. Mechanical and hydraulic dredges are described with a series of tables, indicating the differences between the various types. New dredge designs must take into account the potential ecological damage which they cause, as well as economic advantages. Despite the new water quality requirements, both hydraulic and especially mechanical dredges should continue to have use. (Prague-FIRL)
W74-08893

IMPACT OF BEACH NOURISHMENT ON DISTRIBUTION OF EMERITA TALPOIDA, THE COMMON MOLE CRAB,
Virginia Univ., Charlottesville.
For primary bibliographic entry see Field 5C.
W74-08894

RECENT DEVELOPMENTS ON WATER POLLUTION LEGISLATION,
Environmental Protection Agency, Boston, Mass. Permits Branch.
B. R. Sacks.
The Journal of the Leather Chemists Association, Vol 69, No 4, p 133-142, April, 1974.

Descriptors: *Effluents, *Water pollution control, *Tannery wastes, *Legislation, Costs.
Identifiers: *Water pollution legislation, Permits Program, Industry standards, Municipal pollution, Industrial pollution.

Recent water pollution legislation has changed the appraoches to effluent problems from both a technical and an economic point of view. The present status of the Permits Program and industry standards for effluent are reviewed in relation to regulation of the leather industry. Topics covered include: history of pollution legislation, municipal pollution, industrial pollution, national standards of performance, water quality standards, enforcement, permits and licenses, tannery wastes, and cost recovery. (Prague-FIRL)
W74-08895

HOW WELL DO ENGINEERS FORECAST DEMANDS,
Wisconsin Univ., Madison.
P. M. Berthouex, and K. Thiele.
Water and Sewage Works, Vol 121, No 4, p 54-56, April, 1974. 5 fig, 5 ref.

Descriptors: *Engineering, *Forecasting, *Engineering estimates, Treatment facilities, Water quality, Water quality standards, Design standards, *Demand.
Identifiers: *Accuracy.

The problems in making accurate engineering forecasts are discussed and methods to reduce the forecasting errors are suggested. Engineers face a difficult task in forecasting population, flows, organic loads, and other design inputs and then trying to design a treatment facility to accommodate these loads and have the real plant eventually function to satisfy standards that may exist, 10, 15, or 20 yr into the future. Changes in water quality standards may confront the engineer as an even greater challenge in future planning than population forecasting. If effluent standards or stream standards were clearly stated and the target were fixed, the engineer could plan the development of a treatment system in stages, according to a long term coordinated plan. He could try to take full advantage of economics of scale, of new technology, and of new design procedures. Uncertainty during design works against the designer accomplishing this goal. The impact of this uncertainty on implementation of pollution control technology is great. (Merritt-FIRL)
W74-08905

SEWAGE FLOW CONTROL SYSTEM,
For primary bibliographic entry see Field 5D.
W74-08916

NUTRIENT BALANCES FOR THE EVALUATION OF NUTRIENT SOURCES IN WATER QUALITY MANAGEMENT,
Department of the Environment, Ottawa (Ontario). Water Quality Branch.
For primary bibliographic entry see Field 5B.
W74-08928

DEVELOPMENT OF WATER QUALITY MODELS USING SPECTRAL ANALYSIS AND PARAMETER ESTIMATION TECHNIQUES,
Kansas State Univ., Manhattan. Dept. of Chemistry.
L. T. Fan, and L. E. Erickson.
Available from the National Technical Information Service as PB-232 986; $4.00 in paper copy, $1.45 in microfiche. Kansas Water Resources Research Institute, Manhatten, Contribution Number 140, (1974). 83 p, 23 fig, 24 tab, 20 ref. OWRR B-021-KAN(8). 14-31-0001-3282.

Descriptors: Water quality, Model studies, Stochastic processes, *Ohio River, *Missouri River, *Mathematical models.
Identifiers: *Spectral analysis, Water quality data, *Water quality models, *Parameter estimation, Stochastic data, Transient models, *Detroit River, *Coosa River.

This research was concerned with the analysis and interpretation of water quality data in order to develop improved mathematical models for predicting water quality. Spectral analysis was employed to analyze water quality data from the Coosa, Detroit, Missouri and Ohio rivers. Using the results of spectral analysis, mathematical models were developed to represent the processes taking place in the stream. Once the structural form of a model was obtained, parameter estimation techniques were used to determine the value of the constants and the parameters in the model equations. The study also includes (1) estimation of missing values in water quality data, (2) experimental simulation of thermal discharge monitoring and application of spectral analysis techniques, (3) compilation of water quality data and parameters from Kansas rivers and streams, (4) identification of parameters in transient water quality models from stochastic data, and (5) evaluation of methods for estimating stream water quality parameters in a transient model from stochastic data. The results of this research were reported in a series of publications, a list of which has been provided in this report. A summary of the significant results is presented under separate headings. The overall conclusion was that the different techniques of data analysis presented here were very effective in analyzing stream quality and would serve as valuable tools in model development.
W74-08936

A PLANNED MAINTENANCE MANAGEMENT SYSTEM FOR MUNICIPAL WASTEWATER TREATMENT PLANTS,
EnviroPlan, Inc., College Park, Md. Fairfax County, Va.
For primary bibliographic entry see Field 5D.
W74-08944

DEVELOPMENT OF PREDICTIONS OF FUTURE POLLUTION PROBLEMS,
Battelle-Columbus Labs., Ohio.
For primary bibliographic entry see Field 5B.
W74-08946

THE NUCLEAR SAFEGUARDS PROBLEM,
Cornell Univ., Ithaca, N.Y. Peace Studies Program.
For primary bibliographic entry see Field 5C.
W74-08949

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED HOPE CREEK GENERATING STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-08959

TRANSURANIC SOLID WASTE MANAGEMENT RESEARCH PROGRAMS -- QUARTERLY REPORT, JULY-SEPTEMBER 1973.
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5D.
W74-08963

ON TAXATION AS A POLLUTION CONTROL POLICY,
Pittsburgh Univ., Pa. Graduate School of Business.
R. F. Byrne, and M. H. Spiro.
Swedish Journal of Economics, Vol 75, No 1, p 105-109, 1973. 1 fig, 14 ref. OWRR A-028-PENN(1).

Descriptors: *Economic efficiency, *Pollution taxes(Charges), *Pollution abatement, Standards, Return to scale, Mathematical models, Environmental control, *Taxes, Industrial plants, Water pollution control.
Identifiers: Indivisibilities, *Effluent charges.

It is generally assumed that the use of effluent charges to combat pollution is at least as efficient as the use of pollution standards. It is demonstrated both geometrically and mathematically that such charges may not be efficient when a firm faces a number of productive processes having fixed proportions of pollutants and outputs and constant returns to scale. It is shown geometrically for a firm with two processes and a single input. The alternative process model formulated may be typical of many polluting industries including the steel, phosphate, pulp and paper, and petroleum. The model also covers the common situation where the alternatives consist of one process with or without waste treatment facilities which display indivisibility characteristics. (Schroeder-Wisconsin)
W74-09049

FEASIBILITY STUDY OF A NEW SURFACE MINING METHOD 'LONGWALL STRIPPING,'
Potomac Engineering and Surveying Co., Petersburg, W. Va.
H. F. Moomau, F. R. Zachar, and J. W. Leonard.
Copy Available from GPO Sup Doc as EP1.23:670/2-74-002, $1.15; microfiche from NTIS as PB-233 146, $1.45. Environmental Protection Agency, Technology Series Report EPA 670/2-74-002, February 1974. 67 p, 4 fig, 22 ref. EPA Program Element 1BB040. Contract 68-01-0763.

Descriptors: *Environmental disturbance, *Surface mining, *Strip mining, Auger mining, *Longwall mining, Shortwall mining, Open-end outby, Fresh-air outby, Shallow cover mining, Roof-support, Shearers, Chocks, Conveyors, Continuous miner, Packwalling, Bench, Stowing, Highwall.
Identifiers: *Feasibility studies, *Mining, Coal mines.

'Longwall stripping' is a new surface mining concept developed by the Environmental Protection Agency. Longwall stripping adapts existing underground longwall mining technology for use in recovering shallow cover coal without the total environmental disturbance often associated with surface mining. This study investigated the environmental, mining and economic feasibility of longwall stripping. Longwall stripping was determined to be a feasible method for mining coal under shallow cover. A discussion of the criteria that are necessary to consider in selecting a site and developing the mining plan is included. Additionally, alternate methods of the longwall stripping concept are discussed. (EPA)
W74-09060

IN-PROCESS POLLUTION ABATEMENT: UPGRADING METAL-FINISHING FACILITIES TO REDUCE POLLUTION,
Oxy Metal Fisishing Corp., Madison Heights, Mich., Environmental Services Group.
A. E. Olson, and E. N. Hanf.
Environmental Protection Agency Technology Transfer Seminar Publication 1, July, 1973. 71 p, 25 fig, 4 tab, 14 ref, 2 append.

Descriptors: *Metallurgy, *Industrial wastes, *Pollution abatement, *Control, Water pollution control, Operations, Waste treatment, Air pollution, Industrial plants, Chemicals, Pollutant identification, Technology, Equipment, Water conservation, Toxins, Design, Safety, Economic justification, Metals.
Identifiers: *Metal-finishing industry, Exhaust systems, Ventilation.

A variety of chemicals are utilized in metal finishing to enhance the value of treated items. In-process water pollution abatement techniques are identified including equipment changes, chemical waste reduction, planning to prevent pollution catastrophies, and water conservation techniques. Methods discussed to reduce or eliminate chemical wastes include process substitution, reduction of process solution concentrations, and reduction of finishing solutions carried out over the edge of process tanks. A number of rinsing techniques are examined in attempts to conserve water. The monetary savings generated by the implementation of these methods is illustrated using a case study and cost figures. The ventilation of fumes from work areas and the removal of any contaminant from the exhaust stream that can cause air pollution are examined. Ventilation systems are recommended which meet the Occupational Safety and Health Act Standards and which contain the contaminant to a limited area. Exhaust systems should be constructed of corrosion-resistant and fire-retardant material to ensure long life. Wet scrubbers are designed to abate air pollution hazards with operating data for chrome and nickel-plating evaporator/scrubber systems provided. Appendixes illustrate floor plans, equipment protection, and ventilation systems utilizing pollution control devices. (Schroeder-Wisconsin)
W74-09080

A SIMPLE SIMULATION METHOD FOR RIVER SELF-PURIFICATION STUDIES,
Centre Belge d'Etude et de Documentation des Eaux, Liege.
For primary bibliographic entry see Field 5B.
W74-09093

THE TIDE OF INDUSTRIAL WASTE,
For primary bibliographic entry see Field 5B.
W74-09119

STATE EX REL. LUDWIG V. CITY OF BEMIDJI (ACTION FOR INJUNCTION AND DAMAGES AGAINST CITY FOR POLLUTING RIVER).
For primary bibliographic entry see Field 6E.
W74-09121

DO NUCLEAR PLANTS MAKE DEADLY NEIGHBORS,
Washington Univ., St. Louis, Mo. Center for the Biology of Natural Systems.
B. Commoner.
Today's Health, Vol 50, p 25-27, 59, 62, 64, 67, February 1972. 1 chart.

Descriptors: *Background radiation, *Distribution patterns, *Nuclear reactors, *Radioactivity, *Rain, Nuclear wastes, Radioactive fallout, Atmosphere, Air pollution, Nuclear explosions, Radioactive wastes, Strontium radioisotopes, Radioactive waste disposal, Public health, Human diseases, Mortality, Radioactivity effects, Legal aspects, Economic aspects.
Identifiers: *Administrative regulations.

Rain can bring radioactivity from the air down to earth. Strontium 90, a chemical similar to calcium,

cannot penetrate more than an inch of living tissue, but once it is in the body, the isotope becomes closely packed around the living cells of the bone and presents a great risk of cancer. Strontium 90 is similar to calcium, so grass and food crops draw it from the soil, and foods carry it into our bodies. Experiments have shown that every exposure to radiation carries with it some risk of genetic damage or cancer. The United Nations Scientific Committee on the Effects of Atomic Radiation has estimated that due to nuclear tests through 1958 between 2,500 and 100,000 serious genetic defects have occurred. Dr. Ernest Steinglass estimates that fallout may be responsible for 400,000 infant and fetal deaths. In 1963, a research group was established to plan and conduct studies of environmental contamination due to release of radioactivity. The group recommended that radiation standards be reduced to one-tenth their present level. This recommendation was opposed by the Atomic Energy Commission and the nuclear power industry. In 1971 the AEC finally agreed to a reduction in permissible radioactive release. The experience with nuclear power warns that the capability to intrude on the environment far outstrips knowledge of the consequences. (Sperling-Florida)
W74-09123

IT'S ABOUT TOO LATE FOR TAHOE,
W. Bronson.
Audubon, Vol 73, No 3, p 49-80, May 1971. 2 photo.

Descriptors: Water pollution, *Water pollution control, Ecology, *Watersheds(Basins), *Zoning, Legal aspects, Legislation, Lakes, Wildlife, Wildlife habitats, Turbidity, Erosion, Eutrophication, Environment, Environmental effects, *Nevada, Basins, Land management, Lake basins, *California.
Identifiers: *Lake Tahoe.

The Tahoe Regional Planning Agency (TRPA), originally created to prevent the degradation of the Tahoe Basin, has failed to control the rush of urban development. The forest cover of the area, combined with ecological factors such as meadows, streams, lakes and talus slopes provide habitats for many vertebrates. However, TRPA's zoning plans could permit an increase in population in the area from a 1970 level of 28,000 to a possible 335,000. Water quality has been the primary environmental concern at Lake Tahoe, and the threat of water pollution triggered steps toward basin-wide pollution controls. Algae blooms have occurred due to excessive nutrient contribution and the entrance of turbid water through streams where development is proceeding in the watershed. Correction of the problem can only occur by controlling man-caused erosion in the watershed. However, serious siltation is predicted to continue, and if unabated will result in eutrophication of the lake. TRPA, a bi-state commission ratified by Congress in 1969, has done little to prevent the continuing development of the area, and environmentalists are now looking for the federal government to save Lake Tahoe, which is federally owned. (Ritchie-Florida)
W74-09124

WATER POLLUTION--GOVERNMENTAL ACTIVITIES IN BROWARD COUNTY,
N. S. Davis.
Florida Planning and Development, Vol 23, No 3, p 1-5, March, 1972.

Descriptors: *Florida, *Water pollution sources, *Waste water disposal, *Waste disposal, *Water pollution control, Inter-agency cooperation, Governments, Coordination, Planning, Treatment facilities, Federal government, State governments, Local governments, Water pollution, Water supply, Sewage disposal, Sewage treatment, Farm wastes, Industrial wastes, Municipal wastes, Water quality, Oil wastes, Oceans, Sea water, Shores, Shoreline protection, Water policy.

The physical attributes of water and the legal authority to control pollutants in the water have necessitated intergovernmental responses in Broward County, Florida. Both the interior and coastal waters of Broward County are polluted by both natural and manmade pollutants including dead vegetation, effluent from utility and single installation treatment plants, industrial wastes, laundries, carwashes, on-site disposal facilities, marine toilets, oil from boats, power plants, septic tanks and leaching of soils, especially agricultural areas and fertilized land. Many of the canals in the county are non-flowing waterways with high coliform counts. The major source threatening to contaminate coastal water is wastewater disposal into these offshore waters. The primary interest in this highly urbanized area is in providing an adequate supply of fresh water for domestic purposes and in disposing of the wastewater with the least amount of damage to water sources. The nature of the water pollution problem has created a situation in which federal, state and local governments all have legal authority in the area of water pollution control. Federal funding and planning have stimulated the construction of regional sewage treatment plants, as well as encouraged state and local cooperation. (Silber-Florida)
W74-09125

FOREST FIRES DAMAGE MORE THAN TREES,
American Forestry Association, Washington, D.C.
For primary bibliographic entry see Field 4C.
W74-09126

SUSQUEHANNA RIVER BASIN COMPACT.
For primary bibliographic entry see Field 6E.
W74-09129

NUCLEAR ENERGY AND THE ENVIRONMENT, AN INTERVIEW WITH A.G.C. COMMISSIONER DIXIE LEE RAY,
I. McManus.
American Forests, Vol 79, p 12-15, 42-47, August 1973. 1 chart, 1 tab, 11 photo.

Descriptors: *Electric power industry, *Nuclear energy, *Thermal pollution, *Nuclear wastes, *Nuclear engineering, Nuclear reactors, Electric power production, Cooling towers, Heated water, Water cooling, Water pollution sources, Fish farming, Surface irrigation, Materials engineering, Research facilities, Research equipment.
Identifiers: *Environmental impact statements, National Environmental Policy Act(NEPA).

Nuclear power plants produce excess heat which must be discharged into the environment. The heat is discharged into either the air or into water which is then cooled in condensers, stored in a cooling pond or tower, and ultimately discharged into a stream or river. Fossil fuel plants also discharge heat, but to a lesser extent than nuclear plants. Heated water may be beneficially employed to irrigate crops and warm the soil, possibly extending the growing season. Heated water can be utilized in aquaculture. The amount of excess heat discharged by breeder reactors now under development is approximately equal to that discharged by modern fossil fuel plants. The breeder concept has been known for a long time. There are several different possibilities for a breeder: a light water breeder, a gas breeder, a molten salt breeder, and a liquid metal breeder. A great deal of study involving all countries has led to the conclusion that liquid metal was the most promising. It is believed that there is now enough basic knowledge to construct a large-scale demonstration plant. Nuclear fusion, which utilizes heavy hydrogen found in seawater, is still a process for the future, but after breeder reactors, it offers the best hope for energy. (Sperling-Florida)
W74-09135

ONE DAMMED THING AFTER ANOTHER,
G. Marine.
Environmental Journal, p 14-19, May 1971. 6 photo.

Descriptors: *Lakes, *Rivers, *Dams, *Environmental effects, Salinity, Irrigation, Artificial lakes, Recreation, Hydroelectric power, Electric power, Hydroelectric plants, Structures, Flow, Floods, Flood control, Land reclamation, Land use, Land management, Swamps.

Dams are artificial objects whose purpose is to block or impede the flow of moving water. Some dams are built to restrict the flow of the water with the purpose of regulating its rate or changing its direction, commonly for the purpose of flood control or to regulate the flow so that areas downstream will be available for agriculture, recreation or settlement. In other cases the flow is regulated so that water will be available for diversion into irrigation ditches. At present, more than two thousand dams in the United States are completely silted, and several thousand more will silt over in the next fifty years. Dams at one time meant jobs, development and cheap electrical power, but dams cause extensive environmental damage and do not normally even pay for themselves. Recent studies show that both flood-control and reclamation dams ruin more land than they protect. Dams can cause salinization as well as other forms of irreparable and irreversible damage to water and land. Recreational benefits of artificial lakes have been exaggerated, and the hydroelectric power produced is not as cheap as it was once thought to be. (Ritchie-Florida)
W74-09136

WATER DISCHARGE PERMIT PROGRAM BEGINS DESPITE LACK OF EFFLUENT STANDARDS,
J. A. Noone.
National Journal, Vol 5, p 367-376, March 17, 1973.

Descriptors: *Water law, *Permits, *Water quality control, *Water pollution control, *Industrial waste disposal, Regulations, Wastewater disposal, Legal aspects, Water pollution sources, Water policy, Environmental sanitation, Navigable waters, Federal government, Standards, Administrative agencies, Impaired water quality, Sewage disposal, Water permits, Water utilization, Planning, Water resources development, Water management, Governments, Water treatment, Pollution abatement.

After a court imposed delay of 15 months, the federal government has begun the key element in its program to cleanse the nation's water--a system of permits that eventually will control discharges by some 56,000 industrial, agricultural and municipal polluters. The Federal Water Pollution Control Act of 1972 is the mechanism for carrying out the clean-water operation. The act sets exact limits on amounts of pollutants that can be discharged from specific sources. The new law requires all existing dischargers to meet two levels of standards. By July 1, 1977, industries must have the best practicable control technology currently available while publicly owned treatment works must use secondary treatment. By July 1, 1983, industries must use the best available technology economically achievable, while publicly owned sewage treatment works must have the best practicable waste treatment technology over the life of the works. The Act's main intent is to have all wastewater dischargers meet national effluent standards. The Act also retained the system of quality standards for receiving bodies of water. The permit program is the apparatus by which the two-pronged regulatory scheme functions. (Silber-Florida)
W74-09138

ARCTIC PASSAGE--LEGAL HEAVY WEATHER,
For primary bibliographic entry see Field 6E.
W74-09139

INDUSTRIES WIN FEW CONCESSIONS AS POLLUTION PERMIT PLAN MOVES ON SCHEDULE,
For primary bibliographic entry see Field 6E.
W74-09141

WATERCRAFT: MARINE TOILETS.
For primary bibliographic entry see Field 6E.
W74-09143

EFFECTS OF PENDING FEDERAL DRINKING-WATER LEGISLATION,
For primary bibliographic entry see Field 6E.
W74-09147

WATER IMPROVEMENT COMMISSION.
For primary bibliographic entry see Field 6E.
W74-09148

PROTECTION AND IMPROVEMENT OF WATERS.
For primary bibliographic entry see Field 6E.
W74-09149

PUBLIC WATER SUPPLY, SEWERAGE AND SOLID WASTE DISPOSAL SYSTEM.
For primary bibliographic entry see Field 6E.
W74-09156

NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION.
For primary bibliographic entry see Field 6E.
W74-09163

WHO OWNS THE WATER,
For primary bibliographic entry see Field 6E.
W74-09164

FLOATING BOOM,
N. P. Cerasari.
U. S. Patent No 3,800,542, 4 p, 13 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 921, No 1, p 68, April 2, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, *Water pollution control, *Water quality control, Separation techniques, Equipment, Barriers.

A floating boom can be towed by a vessel around an oil spill or mass of flotsam to collect and contain it. The curved upper end of the support part decreases losses due to wave action. The floating boom comprises at lease three connector cables; the barricade may be solid, semi-permeable, or perforated. Horizontally spaced upright supports are attached to the cables. The supports have an upper curved section and a weighted end part, as well as valves for inflating the buoyant support tubes with compressed gas. (Sinha-OEIS)
W74-09177

APPARATUS FOR REMOVING OIL FROM WATER,
H. V. Hess, and E. L. Cole.
U. S. Patent No 3,800,950, 4 p, 5 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 921, No 1, p 172, April 2, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, *Water pollution control, *Water quality control, Separation techniques, Foam.
Identifiers: Polystyrene foam, Agglomeration, Oleophilic plastic foam.

The method involves projecting open cellular particles of a highly oleophilic plastic foam such as polystyrene having a solvent affinity for petroleum. The oil agglomerates into lumps which can be contained and then burned or otherwise disposed of. The apparatus for carrying out the method includes a heated foaming vessel supplied with foamable plastic particles and means for projecting the particles, after they have been foamed or expanded, upon oil floating on a water surface. These means include a barrel to which the foamed particles are conveyed as well as propulsive means which disintegrate the foamed particles into relatively small particulates, which are then cast onto the oil. Preferably the oil is surrounded by the foamed particles. The apparatus can be mounted on a barge or other vessel. (Sinha-OEIS)
W74-09178

FEASIBILITY STUDY OF HYDROCYCLONE SYSTEMS FOR DREDGE OPERATIONS,
Oklahoma State Univ., Stillwater. Office of Engineering Research.
For primary bibliographic entry see Field 5D.
W74-09202

CENTRIFUGE COALESCER CONCEPT FOR SEPARATING OIL FROM WATER DISCHARGED FROM SHIPS,
Foster-Miller Associates, Inc., Waltham, Mass.
A. C. Harvey, A. R. Guzdar, V. K. Stokes, and A. T. Fisk.
Available from NTIS, Springfield, Va 22151 as AD-764 006, price $12.75 printed copy; $1.45 microfiche. Contract Report No 734305.2/3 for U.S. Coast Guard, February 20, 1973. 203 p, 56 fig, 16 tab, 14 ref, 3 append. 4305. Coast Guard Contract DOT-CG-24287 A.

Descriptors: Oil water, *Ships, *Separation techniques, *Centrifugation, Particle size, Water pollution control, Waste water treatment, *Oil wastes, Pollution abatement, Oil pollution.

A centrifuge was conceived and tested for separation of oil as it is usually dispersed in the bilge and ballast water of ships. The centrifuge is unusual in having predominantly axial flow, allowing comparatively high throughoput and low speed. It has both primary and secondary stages of separation and is thus capable of operating with high input concentrations. The device was tested in the laboratory using mixers in a storage tank and a centrifugal pump to disperse up to 8% oil in water. Effluent concentration in the range of 10 ppm were obtained with inputs containing 1000 ppm of No. 2, No. 4 and Nigerian Crude Oils. At higher concentrations ranging up to 58,800 ppm for No. 2 oil and 18,900 for No. 4 oil the effluent contained less than 100 ppm. Centrifuge performance on No. 2 and No. 4 oils containing 10% Gamlen D was lower than with pure oils. Coalescence occurred but produced drops smaller than with pure oils requiring a modification to the separator design. (Knapp-USGS)
W74-09203

CYCLING AND CONTROL OF METALS.
For primary bibliographic entry see Field 5B.
W74-09206

FAILURE OF BRIBES AND STANDARDS FOR POLLUTION ABATEMENT,
Resources for the Future, Inc., Washington, D.C.
T. Page.
Natural Resources Journal, Vol 13, No 4, p 677-704, 1973. 4 fig, 20 ref.

Descriptors: *Pollution abatement, *Equity, *Industries, Water quality standards, Costs, Regulation, Permits, Governments, Economic efficiency, Welfare(Economics), *Pollution taxes(Charges), Government supports.

Coase's paper 'The Problem of Social Cost' (J. Law and Econ 1, 1960) instigated a series of discussions which emphasized the symmetrical nature of bribes and charges in achieving Pareto optimal solutions in the presence of externalities. The assumption of symmetry is challenged. Two questions are examined. First, the outcomes from bribes and charges, and standards and fees assuming free entry and exits and two industries--one polluting and one not--are generated. Equity conditions are also generated for the movement from pre to post regulation periods. The production function for the polluting industry assumes pollution is a factor of production rather than as a joint product. Pollution abatement is accomplished through the addition of pollution control equipment, changes in production practices, or reduction in output. Results from the modeling effort reveal that free entry and exit make standards and traditionally imposed bribes inefficient. Bribe systems designed to avoid the inefficiency appear either to closely resemble a fee system or to introduce a number of permanent inequalities. The fee system was found to be the best method of achieving both efficient and equitable results. (See also W74-09241) (Schroeder-Wisconsin)
W74-09240

BRIBES AND CHARGES IN POLLUTION CONTROL: AN ASPECT OF THE COASE CONTROVERSY,
Resources for the Future, Inc., Washington, D.C.
A. V. Kneese, and K-G. Maler.
Natural Resources Journal, Vol 13, No 4, p 705-716, 1973. 2 fig, 9 ref.

Descriptors: *Water pollution control, *Non-structural alternatives, *Pollution taxes(Charges), *Government supports, Industries, Welfare(Economics), Economic efficiency, Mathematical models.
Identifiers: Property rights, Equilibrium model.

Coarse initiated an intensive debate over the neutrality of property rights in an efficient allocation of resources. Several authors have claimed that the results are asymmetrical with respect to bribes versus charges. Critics have suggested, for example, that the analysis neglected differences in profit levels which result from varying property rights. Both a graphical analysis and a mathematical general equilibrium model are presented to prove the symmetry conditions. Three situations are examined under the general equilibrium model: (1) Pure charges strategy; (2) a mixed strategy utilizing both bribes and charges; and (3) a pure bribe strategy. It is shown that all three cases can lead to an efficient outcome. However, proof of symmetry is a hollow victory. The information requirements to yield an efficient system of bribes are tremendous. The federal government presently engages in subsidies to encourage pollution abatement. Generally, however, such subsidies are not tied to actual pollution reduction, but to construction cost of waste treatment facilities and may bias the economic alternatives of treatment techniques by not subsidizing by-products. (See also W74-09240) (Schroeder-Wisconsin)
W74-09241

THE ECONOMICS OF ENVIRONMENTAL QUALITY MEASUREMENT,
Ecology Audits, Inc., Dallas, Tex.
R. H. Schulze.
Journal of the Air Pollution Control Association, Vol 23, No 8, p 671-675, 1973. 5 tab.

Descriptors: *Pollutants, *Measurement, *Costs, *Professional personnel, Industries, Training, *Pollution abatement.
Identifiers: Environmental consultants.

The choice between employing environmental consultants and an in-house staff to evaluate the quality of air and water discharges is examined. Figures developed show daily in-house costs covering salaries, fringe benefits, supportive services, and recruitment, by employment categories. Also to be considered are cost of capital equipment and the costs of learning to utilize equipment and the regulatory agencies' framework. Alternatively, service company costs generally are a 2.5-5 multiple of base salaries, depending on part on the length of the contractual arrangement. Billing practices also vary, with some firms charging for all time consumed while other utilizing a rate equal to the time required for a seasoned professional. Also to be weighed are noneconomic factors for an in-house approach including secrecy, making-work, and flexibility, against assumptions of impartiality, availability, cost control and experience which favor a specific service. In general firms having $60,000/year of work per location expenditure with a service agency should consider an in-house process with subsequent auditing by a service agency. With $20,000-60,000 expenditures, in-house should still be considered if it can use under-utilized man hours. In each of these cases, cost is based on information of full time personnel handling these evaluations exclusively. (Schroeder-Wisconsin)
W74-09243

POLLUTION ABATEMENT IN A COPPER WIRE MILL.
Environmental Protection Agency, Washington, D.C. Div. of Technology Transfer.
EPA Technology Transfer Capsule Report 3. Industrial Demonstration Grant with Volco Brass and Copper Company, 1973. 11 p, 1 fig, 2 tab.

Descriptors: *Water pollution control, *Industrial wastes, *Water reuse, Economics, Profit, Copper, *Pollution abatement.
Identifiers: *Copper wire mill.

All copper wire drawing operations require cleaning of the rods before drawing to prevent impurities from being pulled into the drawn wire. This cleaning process, using hydrochloric or sulfuric acid, poses a number of effluent problems which when treated by traditional precipitation methods without changes in the manufacturing processes lead to exhorbitant cost increases and significant amounts of sludge. An alternative method was developed in a pilot study which reduces water consumption by 90% through chemical rinsing and water reuse. The sulfuric acid pickle is regenerated and high purity metallic copper recovered through continuous electrolysis. Hydrogen peroxide-sulfuric acid was shown to be a superior substitute for the chromates and fluoride and nitric acid previously used to remove cupric oxide in the copper rods from which copper wire is produced. Total solids leaving the plant were reduced from 2500 lb/day to less than 100 lbs/day and metal losses from 600-700 lb/day to less than one lb. The estimated saving of the new process over conventional precipitation techniques is estimated at about $2.61/ton of finished wire. A design for implementing the new process is included. (Schroeder-Wisconsin)
W74-09244

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

PREDICTING THE HYDROLOGIC EFFECTS OF LAND MODIFICATIONS,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 4A.
W74-08753

DESIGN OF COST-EFFECTIVE WATER QUALITY SURVEILLANCE SYSTEMS,
Raytheon Co., Portsmouth, R.I. Oceanographic and Environmental Services.
For primary bibliographic entry see Field 5A.
W74-08825

NON-EFFICIENCY OBJECTIVES AND DECISION-MAKING IN WATER RESOURCE DEVELOPMENTS,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
G. A. Vaut, and C. E. Willis.
Water Resources Bulletin, Vol 9, No 6, p 1182-1187, 1973. 32 ref.

Descriptors: *Cost-benefit theory, *Regional development, Economic justification, Equity, Social values, Planning, Regional economics, Decision making, Management.
Identifiers: Social preference function, Multi-objective planning.

Major's proposed inclusion of a regional development objective into traditional public investment benefit-cost analysis represents a basic attempt to implement multi-objective planning (See W70-05577). His approach is evaluated and methods to weigh alternative objectives are examined. In Major's model, weighted regional benefits and costs are added to the traditional national income assessment. The inclusion of a regional objective represents an attempt to include equity considerations into the decision process. It may not be accurate however, to assume that equity considerations are positively affected by water resource development projects. The nebulous regional benefit concept would best be replaced by an operational measure of equity. Measurement problems associated with Major's model are also discussed and three methods to weigh nonefficiency objectives are examined. In the explicit approach decision makers are interviewed directly; in the implicit approach coefficients are inferred from previous decisions; both approaches depend on the consistency and candor of the decision maker. A third method suggested allows the investigator to generate a variety of weights, utilizing sensitivity analysis to suggest the impact of changes in weights on investment decisions. A modified benefit-cost approach is suggested which explicitly includes equity consideration and utilizes a combination of three weighing approaches. (Schroeder-Wisconsin)
W74-09084

2 OBJECTIVES 4 ACCOUNTS,
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-09154

MARINE RESOURCES COUNCIL.
For primary bibliographic entry see Field 6E.
W74-09170

6B. Evaluation Process

MODELING OF HYDROLOGIC PROCESSES AND WATER SALVAGE PROCEDURES IN SEMIARID REGIONS,
Arizona Univ., Tucson. Water Resources Research Center.
For primary bibliographic entry see Field 5D.
W74-08702

PROCEDURES IN FORECASTING USE OF WATER RESOURCES (O METODIKE PROGNOZIROVANIYA ISPOL'ZOVANIYA VODNYKH RESURSOV),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
D. A. Yeliseyev.
Vodnyye Resursy, No 4, p 101-105, 1973.

Descriptors: Water resources development, *Water utilization, *Water conservation, *Forecasting, *Alternative planning, *Water demand.
Identifiers: *USSR.

Qualitative and quantitative changes in the growth of the Soviet national economy during the last several decades have called for a new approach to the utilization of the country's water resources. Use of water resources and, accordingly, construction of large hydraulic installations in the 1920's and 1930's were geared to meet the requirements of hydroelectric power and navigation in European Russia or of agriculture in Soviet Central Asia. In the 1950's and 1960's, the scope of water-resources management increased considerably and today includes virtually all branches of the national economy. Steps required to prepare plans and forecasts for water-resources development and water conservation in the USSR are examined, and emphasis is placed on the need to select alternative plans for evaluation of rates and trends of development of the national economy on the whole and of water management in particular. (Josefson-USGS)
W74-08706

THE LONG-TERM STRATEGY FOR WATER RESOURCES IN THE UK.
Water Services, Vol 78, No 936, p 41-43, February, 1974. 1 fig.

Descriptors: Publications, *Water resources, *Long-term planning, Project planning, Water resources development.
Identifiers: *United Kingdom.

A report by the Water Resources Board of England examines the water resources of England and Wales as a whole and makes recommendations to meet the expected increase in the demand for water up through the year 2000. Findings indicate that no more than five new strategic reservoirs need be built. The report also considers a wide range of possible strategies for the Dee Estuary area where the need for water cannot be met from local sources; a strategy based on a mixture of inland and estuary storage making use of rivers to carry water is recommended. The report is summarized in outline form with project and research recommendations listed. (Sandoski-FIRL)
W74-08794

PROMOTING ENVIRONMENTAL QUALITY THROUGH URBAN PLANNING AND CONTROLS,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 5G.
W74-08828

ENVIRONMENTAL IMPACT ANALYSIS: A REVIEW OF THREE METHODOLOGIES,
Wisconsin Univ., Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6G.
W74-08839

EVALUATING WATER REUSE ALTERNATIVES IN WATER RESOURCES PLANNING,
Utah State Univ., Logan. Center for Water Resources Research.
For primary bibliographic entry see Field 5D.
W74-08940

GEOTHERMICS.
For primary bibliographic entry see Field 2F.
W74-08973

TECHNICAL-ECONOMIC ESTIMATION OF GEOTHERMAL RESOURCES,
Akademiya Nauk URSR, Kiev. Inst. of Technical Thermophysics.
O. A. Kremnjov, V. J. Zhuravlenko, and A. V. Shurtshkov.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1688-1696, 1973. 13 fig, 2 tab, 7 ref.

Descriptors: *Geothermal studies, Investigations, *Hydrogeology, *Aquifer testing, Drilling, Exploration, Hydrothermal studies, Borehole geophysics, Thermal water, Thermal power, Costs, Data collections, Hydrologic data.
Identifiers: *Geothermal power, *USSR.

Tremendous underground heat resources and simplicity of geothermal installations attract ever more attention of power engineers in many countries. To determine conditions and possible scale of earth heat effective utilization it is necessary to compare thoroughly geothermal sources with other energy sources. With increasing depth the thermal water temperature rises as well as the heat output of the well. Non-linearity of the well cost dependence with depth predetermines an optimal depth at which the best technical-economical characteristics of the well as an energy source are achieved. Data on geothermal conditions, well yields, and the influence of the depth on basic economical characteristics of geothermal heat sources are presented. (See also W74-08973) (Knapp-USGS)
W74-09044

EFFICIENCY AND EQUITY IN AUGMENTING WATER SUPPLY,
California Univ., Santa Barbara. Dept. of Economics.
L. J. Mercer, and W. D. Morgan.
Available from the National Technical Information Service as PB-233 131, $3.00 in paper copy, $1.45 in microfiche. Completion Report, December 1973, California Water Resources Center, Davis, Project UCAL-WRC-W-345. 15 p, 2 fig, 4 tab, 4 ref. OWRR A-041-CAL(1).

Descriptors: *Cost analysis, *Mathematical models, *Economic efficiency, Water supply, *Equity, Investment model studies, *Cost-benefit analysis, Taxes, Financing, *California.
Identifiers: Santa Barbara County(Calif), San Luis Obispo County(Calif), *Water supply augmentation.

This study includes analysis of two issues in augmenting water supply: efficiency and equity. The efficiency analysis rests on an operational (computerized) benefit cost model developed to evaluate the optimal timing of investment for water supply augmentation. Benefits in this model are estimated by both an opportunity cost approach and a willingness to pay approach with both parallel shifts and rotating (around the initial intercept) shifts of the water demand curve which is estimated in a linear fashion. The equity portion of the study entails analysis of the geographical distribution of benefits relative to payments with alternative plans for financing the study project. Plans analyzed include: (a) full reliance on a uniform countywide property tax to cover the financial obligation incurred; and (b) a unit charge (long run financial or resource cost) to water districts for delivered water and a countywide property tax to meet any remaining obligation. Analysis of geographical equity under alternative financing plans indicates that full reliance on a countywide property tax would be the worst solution. A combination of long run unit charges (either financial or resource cost) for water delivered and a countywide property tax in the early years to cover the remaining financial obligation is a superior financing plan from the viewpoint of equity among geographic areas as well as efficiency. (Snyder-California, Davis)
W74-09051

THE DEMOGRAPHIC, POLITICAL, AND ADMINISTRATIVE SETTING,
Florida Univ., Gainesville. Urban Studies Bureau.
C. Feiss, R. McQuown, P. Roberts, and R. May.
Available from the National Technical Information Service as PB-233 164, $3.25 in paper copy, $1.45 in microfiche. Rookery Bay Land Use Studies, Study No 1. Published by the Conservation Foundation, Washington, D.C., September 1973. 29 p, 1 fig, 8 tab, 13 ref. OWRR C-4022(No 9004)(2), C-1817(No 3170)(2) and C-2201(No 3385)(2).

Descriptors: *Florida, *Social aspects, *Political aspects, *Land use, Estuaries, Bays, Management, *Human populations, *Administration.
Identifiers: *Collier County(Fla), *Rookery Bay(Fla).

The social, political and managerial issues impacting a mangrove-estuarine area in Collier County, Florida, relating to the development of land-use strategies to protect the area's natural sanctuary, Rookery Bay, are discussed. Population, employment, land ownership, government, planning machinery, citizen activities, political climate and development pressures of the area as they affect on the sanctuary are examined. Several alternative approaches for the future of the sanctuary are offered and recommendations are made for protective action.
W74-09058

HYDROGRAPHY AND BEACH DYNAMICS,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
T. N. Lee, and B. J. Yokel.
Available from the National Technical Information Service as PB-233 165, $3.75 in paper copy, $1.45 in microfiche. Rookery Bay Land Use Studies, Study No 4. Published by the Conservation Foundation, Washington, D.C., November 1973. 51 p, 12 fig, 9 tab, 8 ref. OWRR C-4022(No 9004)(3), C-1817(No 3170)(3) and C-2201(No 3385)(3).

Descriptors: *Florida, Bays, Estuaries, Tides, Gulf of Mexico, *Hydrograph analysis, *Land use, *Beaches.
Identifiers: *Rookery Bay(Fla), Beach dynamics.

Hydrologic and beach dynamics studies were conducted in and near Rookery Bay Sanctuary south of Naples on the southwest coast of Florida. These studies determined water exchange rates, tidal range variations, the characteristics of the tidal prism, bottom contours, the basin capacities and changes occurring in the geometry of the channels connecting the Sanctuary system with the Gulf of Mexico. Rookery Bay has an average depth of 3.0 feet, a mean volume of 135 million cubic feet and an effective mean tidal prism of 154 million cubic feet. The mean renewal rate for Rookery Bay was estimated at between one and ten days, with the best estimate being 3.2 days. Henderson Creek has an average depth of 2.5 feet, a mean volume of 41.5 million cubic feet and an effective mean tidal prism of 37.1 million cubic feet. The mean renewal rate for Henderson Creek was estimated at between one and six days with the best estimate being two days. Data on mean high tide levels at four stations for 23 months were presented. It was shown that long-term studies are needed to accurately determine mean high water level and that serious sources of error may result from short term studies. The changing configurations of Keewaydin and Little Marco Islands are illustrated and the implication for the Sanctuary discussed.
W74-09059

AN ANNOTATED BIBLIOGRAPHY FOR ECONOMIC EVALUATIONS OF THE AQUACULTURE OF SELECTED CRUSTACEANS AND MOLLUSKS,
California Univ., Davis. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 10C.
W74-09067

QUALITY OF LIFE IN KICKAPOO VALLEY COMMUNITIES,
Wisconsin Univ., Madison. Inst. for Environmental Studies.
E. A. Wilkening, P. Wopat, J. G. Linn, C. Geisler, and D. McGranahan.
Report 11, September 1973. 114 p, 7 fig, 58 tab, 1 append. NSF GI-29731.

Descriptors: *Baseline studies, *Economic impact, *Social impact, *Reservoirs, Social aspects, Recreation, Tourism, Flood control, Environmental effects, Wisconsin.
Identifiers: *Kickapoo River(Wis.), *La Farge Dam(Wis.), Quality of life.

The Kickapoo River is the site of a proposed recreation and flood control reservoir in southwestern Wisconsin. This study sought to establish social and economic baseline information on communities to be affected prior to the project's completion. Information was gathered in 1972 primarily by a study of 12 communities--six within the project area and six outside the valley--by interviewing 18-23 leaders of each community. Additional data were collected from the U.S. Census Bureau and agency records. All six communities in the valley suffered declines in farm number, population, and cropland, which may have strongly influenced the desire for a permanent lake. Median income in the five county area ranges $1777-$3348 below the 1970 Wisconsin median of $10,068. Respondents rated services in each community on a continuum from 'very poor' to 'very good.' Areas evaluated included industrial opportunities, schools, health and medical facilities, special programs for the underpriviledged, water and waste systems, fire protection, flood protection, police, local business, transportation, housing, zoning adequacy, taxes, recreational facilities, and civic involvement. Majority of communities thought the dam would have some or a large effect but were uncertain as to the precise effect. The major benefit perceived was tourism, recreation, and new industries. (Schroeder-Wisconsin)
W74-09068

1971 UMPQUA RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Port Orford. Div. of Management and Research.
T. Gaumer, D. Demory, and L. Osis.
Available from the National Technical Information Service as COM-73-11645. June 1973. 26p, 6 fig, 15 tab. NO4-3-208-55 DACW 57-72-C-0138 NOAA N208-0073-72(N).

Descriptors: *Fishing, *Oregon, *Recreation, *Estuarine fisheries, Fish migration, Shellfish, Herrings, Commercial fishing, Fish harvest, Systematics.
Identifiers: Umpqua River Estuary(Ore.).

In 1971 the Oregon Fish Commission instigated a comprehensive study of recreational use and users of 16 Oregon estuaries. Data collected on the Umpqua River Estuary, a 5712 acre bay containing 1531 acres of tideland and located 222 miles south of the Columbia River, are summarized. Interviews with 3985 boat, shore, tideland, and scuba users provided the basic data source, with additional commission reports providing commercial landings and values of fish and shellfish. Utilizing these data, maps identifying principal boat fishing areas, clam beds, eel grass beds, food production areas, fish feeding areas, fish migration routes and herring spawning areas were developed. Fish comprised 69 and 97% of boat anglers' and shore anglers' catches with striped bass and Pacific tomcod

respectively, representing the major catch for each category. Soft shell clams made up 100% of tideflat users' take. The estimated 196,300 total estuary catch represents 107,600 fish, 84,600 clams, and 4,100 crabs. Nearly 85% of anglers interviewed were Oregon residents, with 30% residents of Douglas county. Commercial landings of marine food fish and shellfish cought in the Umpqua River Estuary in 1971 totaled 333,376 pounds valued at $60,791. Shad was the principal species landed. (Schroeder-Wisconsin)
W74-09069

ENVIRONMENTAL QUALITY, INCOME DISTRIBUTION, AND FACTOR MOBILITY: THE CONSEQUENCES OF LOCAL ACTION,
New Mexico Univ., Albuquerque. Dept. of Economics.
G. C. Hufbauer.
Journal of Economic Issues, Vol VII, No 2, p 323-335, 1973. 4 tab, 6 ref.

Descriptors: *Environment, *Social adjustment, *Urban sociology, Local governments, Social mobility, Income distribution, Financing, Oregon, Community development, Economic impact.
Identifiers: Boulder(Colo.).

The consequence of a local community's environmental improvement programs on the income level of landholders, capitalists, and laborers and the social expectations of its inhabitants is examined. A model assumes an open economy, a single output produced, using two factors--land and a composite variable input composed of labor and capital--a balanced governmental budget, and environmental problems amenable to local solutions. A modified Harberger system of eight equations is used to determine the percentage change in output and factor quantities and prices. Costs to restore the environment to a priori standard are assumed to be proportional to expenditures per unit of variable input consumed; and in the alternative are assumed to be dependent on the total outlay. The elasticities of product demand and variable supply are assumed (equal to 10) and the elasticity of substitution assumed unitary. An environmental program financed through land taxes will not affect community outputs, enlarges labor and capital stock, and generates a rise in total wages. Alternatively, a tax on the variable factor depends on the capitalists' and laborers' valuation of the benefits of the program. If benefits exceed the costs and output rents, total variable wage and community population will increase. If costs exceed benefits, population, landholder, and variable factor earnings will decline. (Schroeder-Wisconsin)
W74-09070

MULTINATIONALS NEED NEW ENVIRONMENTAL STRATEGIES,
Denver Research Inst., Colo. Industrial Economics Div.
J. G. Welles.
Columbia Journal of World Business, Vol 8, No 2, p 11-18, 1973. 7 ref.

Descriptors: *Environment, *Management, *Industries, *Control, Social impact, Limiting factors. Recycling, Costs, Political aspects, Governmental interrelations, Trade associations.
Identifiers: Multinational companies, Global pollution control, Corporate responsibility, Pollution havens.

Three questions are examined based on a 1972 survey of environmental strategies gathered from 130 interviews of multinational firms' representatives, industrial trade associations, and financial institutions. The first question keys on ways to inject an environmental dimension into management decisions of multinationals. Methods discussed include the creation of corporate environmental managers, environmental site selection analysis, material balance analysis, and corporate environmental impact statements. Also discussed are changing managerial attitudes on the implication of environmental degradation by industry. The second question examines the responses of multinationals to 'pollution havens' in underdeveloped countries. Responses showed that only the highest polluting industries or those whose further expansions are blocked in their present location are likely to be attracted to 'pollution havens' and then with indeterminate benefits. The third question examines the multinationals' ability to stimulate more uniformity in pollution controls among nations and the resultant advantages. Aggressive cooperation between trade associations and government is asserted to be the best strategy to accomplish globally uniform controls. (Schroeder-Wisconsin)
W74-09071

A STOCHASTIC INVESTMENT MODEL FOR A SURVIVAL CONSCIOUS FIRM APPLIED TO SHRIMP FISHING,
Houston Univ., Texas.
R. G. Thompson, M. D. George, R. J. Callen, and L. C. Wolken.
Applied Economics, Vol 5, No 2, p 75-87, 1973. 6 tab, 12 ref.

Descriptors: *Decision making, *Commercial fishing, Marine fisheries, Shrimp, Texas, Risk, Capital supply, Economic justification, Mathematical models.
Identifiers: Texas Gulf Coast.

From observation that the growth in capacity of fishing firms on the Texas Gulf Coast has been less rapid than maximizing net worth subject to capital rationing would suggest, a stochastic capacity expansion model for a survival conscious firm is developed. In the model, the firm maximizes expected net worth at the end of a planning period, subject to the constraint that there is no (probability) chance for bankruptcy to occur. The control variable in the model is capacity units purchased for the planning period. The model is also compared to the simple maximization model. Under the latter, bankruptcy is not an unlikely result. The application of the survivor model to the shrimp fishing industry appears to justify the modest industry growth in periods of expected favorable returns. Two limitations are noted: First, the model assumes survival is paramount and may not be applicable when survival is not a primary consideration; also, the limitation of the constant marginal utility of income assumption. (Schroeder-Wisconsin)
W74-09072

DYNAMIC ECONOMIC MANAGEMENT OF MIGRATORY WATERFOWL,
G. M. Brown, Jr., and J. Hammack.
The Review of Economics and Statistics, Vol LV, No 1, p 73-82, 1973. 2 fig, 1 tab, 15 ref, 1 append.

Descriptors: *Mathematical models, *Waterfowl, *Management, Optimization, Wetlands, Hunting, Value, Ponds, Canada, United States, Costs, Benefits, Game birds, Welfare(Economics).

A model to estimate transient and steady-state conditions necessary to achieve a social optimum in the allocation of resources for waterfowl production is developed. Essential components of the model include a hunter net valuation equation assuming the value of bagged waterfowl is a function of income, number previously bagged, seasons hunted, and hunting cost. Cost functions to produce additional birds utilizing ponds and a waterfowl production function are also estimated. The model seeks to maximize the present value of net income stream through manipulation of two variables: number of waterfowl bagged, and number of ponds utilized. First order requirements assert the best stock level equates the natural resource (waterfowl) marginal growth rate with the discount rate. Two biological production functions, a multiplicative form and a modified Beverton and Holt relationship having a constant return scale are used to activate the model. Hunters' valuation was assumed to equal the compensating variation of consumer surplus. A 1969 survey of 5000 hunters in the Pacific Flyway was used to estimate the relationship. Optimal value from the model's assumption of pond costs of either $12 or $17 show 9.5-17.2 million breeders required instead of the existing 7.8 and from 2.0-7.5 million ponds contrasting the existing 1.3. (Schroeder-Wisconsin)
W74-09073

DEVELOPING A STATE WATER PLAN--MUDDY CREEK DAM AND RESERVOIR, EMERY COUNTY, FEASIBILITY STUDY,
Rollins, Brown and Gunnell, Inc., Provo, Utah.
Available from the National Technical Information Service as COM-73-10385 $3.00 in paper copy, $1.45 in microfiche. Four Corners Regional Commission, Farmington, N.M. Report FCRC-TA-401-505-063, August 1971, 59 p, 18 fig, 13 tab.

Descriptors: *Feasibility studies, *Reservoirs, *Economic effciency, Capital costs, Operating costs, Cost-benefit analysis, Utah, Irrigation, Design, Land classification, Land use, Land tenure, Water rights, Surface water availability, Groundwater availability, Recreation, Water pollution control, Flood protection, Sedimentation, Colorado River Basin, Agriculture.
Identifiers: *Muddy Creek Reservoir(Utah).

The feasibility of a proposed dam on Muddy Creek located in southeastern Utah is examined. The creek is in the Dirty Devil River Basin, a portion of the Upper Colorado River Basin. Land in the project area is used primarily for the production of small grains, corn, alfalfa, and pasture for livestock, with a total of 8066 irrigated acres. A variety of data including distribution of crops, yields, land ownership, land classification, surface water supply ground water supply and water rights are discussed. The proposed reservoir will be a multipurpose facility including but not limited to irrigation, fish and wildlife, recreation and water pollution control. Construction design elements include a rolled earth and rock fill dam, outlet works, diversion and division structures, and a spillway. Total reservoir capacity inclusive of dead storage is expected to be 12,000 acre feet. The 50-year volume of sediment contained in the reservoir is projected to be 3200 acre feet. Total cost of construction is estimated at nearly $1,600,000. The combined direct benefits and repayment capacity of the project are shown to exceed $45,000 annually. (Schroeder-Wisconsin)
W74-09075

IN-PROCESS POLLUTION ABATEMENT: UPGRADING METAL-FINISHING FACILITIES TO REDUCE POLLUTION,
Oxy Metal Fisishing Corp., Madison Heights, Mich., Environmental Services Group.
For primary bibliographic entry see Field 5G.
W74-09080

A TEST OF COMBINATIONS OF MODELS FOR PROJECTING THE POPULATION OF MINOR CIVIL DIVISIONS,
Rutgers - The State Univ., New Brunswick, N.J.
M. R. Greenberg.
Economic Geography, Vol 48, No 2, p 179-188, 1972. 1 fig, 3 tab, 46 ref. OWRR C-1629(3147) (6), 14-31-0001-3147.

Descriptors: *Forecasting, *Human population, *Spatial distribution, Planning, Social mobility, Growth rates, Cities, Suburban areas, Monte Carlo method, Regions, *Population, Projections.
Identifiers: *New York Metropolitan Region, Distributional factors, Municipalities.

Several methods to project population distributions and growth in minor governmental subdivisions are examined. Each method seeks to include

historical-behavioral changes which anticipate alterations in observed growth and distributions, at different spatial levels, and to minimize errors resulting from multiple assumptions. Population projections for 567 municipalities in the New York Metropolitan Region through 1985 are examined. The interpendencies and importance of zoning ordinances, property taxes, fertility levels, and transportation patterns are considered. Three projection methods are illustrated. A random sample of 10% of communities in the region over a five year period was conducted to illustrate how direct projections of minor governmental units' populations are made. These projections were developed assuming a geometric growth rate, a logistic rate, and a form developed by Newling. Alternatively, population projections were made by extrapolating from national projections. It was found that this ratio method was fruitful only if a number of behavioral trends could be inserted at varying spatial levels. A third approach first allocated national projections and then utilized direct projections to adjust the former. This method was found the most accurate and the most costly. The choice of projection methods depends on the willingness of the researcher to trade-off cost for accuracy. (Schroeder-Wisconsin)
W74-09081

A COST ANALYSIS OF WASTE MANAGEMENT IN THE STEEL INDUSTRY,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
D. P. Tihansky.
Journal of the Air Pollution Control Association, Vol 22, No 5, p 335-341, 1972. FWPCA 5-FI-WP-26,285-02.

Descriptors: *Pollution abatement, *Cost analysis, *Mineral industry, Industrial wastes, Capital costs, Operating costs, Waste treatment, Maintenance costs, Water pollution control, *Steel, Industries, Economics.

Three levels of pollution abatement costs in steelmaking are examined. First, the overall costs to the industry are estimated for a 21-year period. Since 1951, U.S. steel corporations have expended $1.2 billion for air and water pollution abatement facilities. Current annual operating costs for gaseous and liquid waste reduction total an additional $70 million each. Pollution costs are shown to vary with the age of steel plants. Modernization, for example, can lead to improved pollution control through greater efficiency and economy in the use of resource inputs. A second level explores the abatement costs for a specific American steel company. This company expended $8 million for abatement equipment during the 1951-1967 period. Operating expenses added an additional $750,000. Capital and operating costs are separated for air and water pollution abatement for the firm and the industry. The final level explored provides cost estimates of air and water pollution controls for typical steel production stages. Departments examined include the coke plant, blast furnaces, basic oxygen furnaces, blooming mill, sheet mill, continuous pickling, tube mill, and coupling, over the 1951-67 period. (Schroeder-Wisconsin)
W74-09082

TOWARD A BETTER UNDERSTANDING OF RECREATIONAL BOATING IN THE ADIRONDACK LAKES REGION,
Northeastern Forest Experiment Station, Syracuse, N.Y. Recreation Research Unit.
H. E. Echelberger, and G. H. Moeller.
Water Resources Bulletin, Vol 9, No 6, p 1266-1271, 1973. 1 fig, 3 tab, 6 ref.

Descriptors: *Lakes, *Recreation, *Boating, Physical properties, Boat-launching ramps, New York, Management, Control, Correlation analysis.
Identifiers: *Adirondack lakes.

The relationship between lake characteristics and varying peak period boat use on the Adirondack lakes is explored to aid recreational management decisions. The 14 lakes ranging in size from 851 to 6976 acres are located in the New York Adirondack Forest Preserve. Data were collected on four warm sunny weekend afternoons at three half-hour intervals, a time considered to represent the peak period. Holiday weekends were excluded. Boat counts were made by aerial observations on 12 lakes with surface counts for the remaining two. Boat user counts were averaged to determine the average peak use by lake. A number of variables including accessibility, lake configuration, commercial lodging accommodations, traffic volume, proximity of the lakes, launching facilities, and boat slips were hypothesized as having influence on peak user rates. To estimate the relationship, factor analysis was used to reduce the number of variables that were functionally related followed by stepwise regression. Results indicate that 69% of the variation in peak usage is accounted for by the number of launching facilities with accommodation boat slips; lake size and shoreline also affect usage. Accessibility, landscape quality, traffic volume, and availability of other lakes were found to be unrelated to usage. (Schroeder-Wisconsin)
W74-09083

1971 TILLAMOOK BAY RESOURCE USE STUDY,
Oregon Fish Commission, Port Orford. Div. of Management and Research.
T. Gaumer, D. Demory, and L. Osis.
Available from National Technical Information Service as COM-73-11688. August 1973. 28 p, 7 fig, 15 tab. DACW 57-72-C-0138, NOAA N208-0073-72(N) and NO4-3-208-55.

Descriptors: *Oregon, *Recreation, *Estuarine fisheries, Fishing, Shellfish, Fish, Commercial fishing, Systematics, Fish harvest.
Identifiers: *Tillamook Bay(Ore).

The Oregon Fish Commission initiated a comprehensive study of recreational users and uses of 16 Oregon estuaries in 1971. Data collected on Tillamook Bay, the third largest bay in the state encompassing 4163 acres of tidelands are summarized. Interviews with 15,700 boat and shore anglers, tideflat users, and scuba divers provided much of the data, with additional commission reports providing information on commercial landings and values of fish and shellfish. From this information, maps identifying principal boat fishing areas, clam beds, eel grass beds, commercial oyster leases and potential growing areas, fish feeding areas, migration routes, and herring spawning areas were generated. Dungeness crabs and chinook salmon accounted for 96% of the boat anglers' catch; 17,500 shore angler trips were also expended with 52% of their activity concentrated on the bay's north jetty. Pile perch and kelp greenling represented the principal species taken by this group. Of the 24,500 tideflat user trips, 98% were expended for calm digging. Nearly 73% of the bay users were Oregon residents, 21% were Tillamook County residents, and 6% were nonresidents. Commercial landings of marine food fish and shellfish caught in 1971 totaled 343,130 pounds valued at $300,009. Oyster was the principal species harvested. (Schroeder-Wisconsin)
W74-09085

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

MODELING OF HYDROLOGIC PROCESSES AND WATER SALVAGE PROCEDURES IN SEMIARID REGIONS,
Arizona Univ., Tucson. Water Resources Research Center.
For primary bibliographic entry see Field 5D.
W74-08702

TURNKEY CONTRACTS FOR SEWAGE TREATMENT PLANTS,
For primary bibliographic entry see Field 5D.
W74-08786

ANALYSIS OF POLLUTION CONTROL COSTS,
Baker (Michael), Jr., Inc., Beaver, Pa.
For primary bibliographic entry see Field 5G.
W74-08829

PHOSPHORUS REMOVAL COSTS,
For primary bibliographic entry see Field 5D.
W74-08855

A PLANNED MAINTENANCE MANAGEMENT SYSTEM FOR MUNICIPAL WASTEWATER TREATMENT PLANTS,
EnviroPlan, Inc., College Park, Md. Fairfax County, Va.
For primary bibliographic entry see Field 5D.
W74-08944

SULFURIC ACID AND FERROUS SULFATE RECOVERY FROM WASTE PICKLE LIQUOR,
Fitzsimons Steel Co., Youngstown, Ohio.
For primary bibliographic entry see Field 5D.
W74-08945

THE ECONOMICS OF THE SMALL GEOTHERMAL POWER STATION,
Department of Scientific and Industrial Research, Wairakei (New Zealand). Chemistry Div.
R. James.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1697-1704, 1973. 6 fig, 14 ref.

Descriptors: *Thermal power, *Geothermal studies, *Electric power costs, Economies of scale, Costs, Income, Prices.
Identifiers: *Geothermal power, *New Zealand.

A geothermal borehole, Tauhara No. 1, near Taupo, New Zealand, was investigated for the economics of generation of electrical energy and for the industrial application of the large amount of heat energy usually wasted in the rejected bore water. A power plant of 10 MW(e) could be erected for about 1.14 million dollars (N.Z.) at a generating cost of about 0.2 cents/kWh(e), which is a very attractive figure. The specific cost per kilowatt of small plants could be as cheap as that of very large plants, in other words, the 'scale effect' does not apply for geothermal power in New Zealand. An enormous volume of hot fluids is rejected at large geothermal projects such as that at Wairakei. The heat energy, if sold at even half the price of that produced by coal-fired boilers, would realize about 6 million dollars per year. (See also W74-08973) (Knapp-USGS)
W74-09045

ECONOMICS OF THE GEYSERS GEOTHERMAL FIELD, CALIFORNIA,
Thermal Power Co., San Francisco, Calif.
D. A. McMillan, Jr.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1705-1714, 1973. 5 fig, 1 tab, 56 ref.

Descriptors: *Thermal power, *Geothermal studies, *Electric power costs, *California, Economies of scale, Costs, Income, Prices.
Identifiers: *Geothermal power, *Geysers field(Calif).

The economics of The Geysers geothermal field located approximately 75 miles north of San Fran-

cisco, California, is discussed. At plant use conditions The Geysers geothermal field produces a dry, slightly superheated steam of which about 0.5% are non-condensable gases. The cost of the geothermal energy at The Geysers is lower than $0.005 per kWh produced. This cost is calculated on the basis of the actual price of the steam $0.0026. The average cost of conventional thermal and atomic electrical power in California is around $0.007 per kWh. The corrosion, incrustation, and waste water disposal problems are under easy control in The Geysers field. The conservative cost of $0.005 per kWh is inclusive of those expenses. (See also W74-08973) (Knapp-USGS)
W74-09046

ECONOMICS OF GEOTHERMAL ELECTRIC POWER GENERATION AT MATSUKAWA,
Japan Metals and Chemicals Co. Ltd., Tokyo. Exploitation Dept.
S. Nakamura.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1715-1716, 1973.

Descriptors: *Thermal power, *Geothermal studies, *Electric power costs, Economies of scale, Costs, Income, Prices.
Identifiers: *Geothermal power, *Japan(Matsukawa).

The economics of geothermal power at a site in the Matsukawa area of the Iwate Prefecture, Japan, is discussed. The total expenditure for surveys and research came to approximately yen 160,000,000. During the approximately 6-year survey period, the major part of this expenditure was for five test borings. Six steam wells were drilled to depths of 1000 to 1500 meters at a cost of yen 439,000,000. Compared with costs in Italy, New Zealand, and the United States, this figure is rather high. However, this is the first such development project in Japan, and so, in addition to the lack of precedent, there were problems concerning drilling technology and machinery. Total cost of constructing the 20,000 kW plant (including interest and all connected costs) was yen 2,057,000,000. Construction cost per kW was yen 102,850, about 1.5 to 2.0 times that for domestic thermal power generation plants. At yen 2.63/kWh, the present cost of generation is on a level with that of thermal power. However, the fuel supply is inexhaustible, and there is no expenditure for the fuel. (See also W74-08973) (Knapp-USGS)
W74-09047

WAIRAKEI POWER STATION NEW ZEALAND--ECONOMIC FACTORS OF DEVELOPMENT AND OPERATION,
Ministry of Works, Wellington (New Zealand).
J. H. Smith, and G. R. McKenzie.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1717-1723, 1973. 6 tab, 8 ref.

Descriptors: *Thermal power, *Geothermal studies, *Electric power costs, Economies of scale, Costs, Income, Prices.
Identifiers: *Geothermal power, New Zealand.

The Wairakei geothermal power station, New Zealand, is described in terms of its technical characteristics, installation costs and maintenance costs. Cost of NZ $225.37 per kilowatt installed is based on the total installed capacity of 192.6 MW. (See also W74-08973) (Knapp-USGS)
W74-09048

ON TAXATION AS A POLLUTION CONTROL POLICY,
Pittsburgh Univ., Pa. Graduate School of Business.
For primary bibliographic entry see Field 5G.
W74-09049

2 OBJECTIVES 4 ACCOUNTS,
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-09154

FAILURE OF BRIBES AND STANDARDS FOR POLLUTION ABATEMENT,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-09240

BRIBES AND CHARGES IN POLLUTION CONTROL: AN ASPECT OF THE COASE CONTROVERSY,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-09241

THE ECONOMICS OF ENVIRONMENTAL QUALITY MEASUREMENT,
Ecology Audits, Inc., Dallas, Tex.
For primary bibliographic entry see Field 5G.
W74-09243

POLLUTION ABATEMENT IN A COPPER WIRE MILL.
Environmental Protection Agency, Washington, D.C. Div. of Technology Transfer.
For primary bibliographic entry see Field 5G.
W74-09244

6D. Water Demand

PROCEDURES IN FORECASTING USE OF WATER RESOURCES (O METODIKE PROGNOZIROVANIYA ISPOL'ZOVANIYA VODNYKH RESURSOV),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 6B.
W74-08706

PROCEDURAL PROBLEMS IN PROJECTED PLANNING OF WATER CONSUMPTION AND DIVERSION BY INDUSTRY IN THE USSR (METODICHESKIYE VOPROSY RASCHETA VODOPOTREBLENIYA I VODOOTVEDENIYA V PROMYSHLENNOSTI SSSR NA PERSPEKTIVU),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 3E.
W74-08710

AGRICULTURAL DEMAND FOR WATER IN THE PECOS RIVER BASIN: AN ADDENDUM,
New Mexico Univ., Albuquerque. Dept. of Economics.
For primary bibliographic entry see Field 3F.
W74-08756

THE LONG-TERM STRATEGY FOR WATER RESOURCES IN THE UK.
For primary bibliographic entry see Field 6B.
W74-08794

TRENT-WITHAM-ANCHOLME SCHEME AND PROJECT OF THE LINCOLNSHIRE RIVER AUTHORITY,
Lincolnshire River Authority (England). Water Resources Dept.
For primary bibliographic entry see Field 6E.
W74-08882

MEETING WATER DEMANDS IN THE CHINO-RIVERSIDE AREA,
California State Dept. of Water Resources, Sacramento.
C. R. White.
Bulletin No 104-3, May 1971. 27 p, 20 fig, 3 tab.

Descriptors: *Water supply, *Groundwater, *Planning, *California, Alternate planning, Economic impact, Land use, Surface water, Water sources, Value, Water management(Applied), Imported water, Water storage.
Identifiers: *Southern California, Chino-Riverside area(Calif.).

The California Chino-Riverside area occupies 641 square miles throughout portions of Riverside, San Bernardino and Los Angeles counties. The 1965 water demand for the area was approximately 450,000 acre-feet; it is estimated to reach 850,000 by 2015. To meet this projected demand an investigation of alternative supply sources was conducted. Nearly 12 million acre-feet of water is stored in ground water basins in the area, which is replenished at an annual average of 394,000 acre-feet. Current ground water extraction accounts for 70% of the demand with imported water from the Bunker Hill-San Timoteo Basin and the Colorado River covering 18% and 6% of the total. Four plans to meet future demand are considered. First, a maximum amount of imported water for artificial recharge while using ground water for demand. Plan 2 also maximizes imported water for direct delivery while reducing ground water pumping. Both plans would increase ground water storage by 2015. Plan 3 uses a maximum of ground water without depleting the last 50 feet. Plan 4 would stabilize existing water levels, supplementing pumping with imported water. Water sources, water quality, and costs were estimated for each plan. The least expensive alternatives are 1, 3, 4 and 2, respectively. (Schroeder-Wisconsin)
W74-09076

MEETING WATER DEMANDS IN THE RAYMOND BASIN AREA,
California State Dept. of Water Resources, Sacramento.
Y. Higashi.
Bulletin No 104-6, June 1971. 54 p, 29 fig, 15 tab, 13 ref.

Descriptors: *Water demand, *Groundwater availability, *Conjunctive use, *Alternate planning, Geohydrology, Legal aspects, Safe yield, Water quality, Water spreading, Water costs, Water distribution(Applied), Imported water, Watershed management, Water supply, California, Watersheds(Basins).
Identifiers: Raymond Basin(Calif.).

A three phase investigation examining the geology, hydrology and operation-economics was conducted to provide local agencies in the Raymond Basin area information on a wide range of alternative combinations of water supply sources and facilities. The basin is located immediately northeast of Los Angeles. The first two phases of the investigation yielded data on local availability of water supplies, water quality, and information on the characteristics of the basin. A mathematical model was also developed to simulate future water level fluctuations in the basin. Demand is expected to grow from 52,000 acre-feet in 1970 to 70,000 in 2020. The ground water is identified as one of the most significant sources of water; in 1970, nearly one million acre-feet was stored in the basin. Net future replenishment under mean hydrologic conditions is estimated at 24,600 acre-feet. Four plans are examined to meet future demands. These plans vary from relying exclusively upon the basin's ground water to the exclusive use of imported water. Facilities, costs and resultant ground water levels are explored for each plan. (Schroeder-Wisconsin)
W74-09077

THE UPPER HUDSON WHITEWATER OR WASHWATER,
L. Pringle.
Audubon, Vol 73, No 2, p 88-100, March 1971. 1 map, 1 photo.

Descriptors: *Hudson River, *New York, Dams, *Damsites, *Water distribution, *Water demand, *Environmental effects, Flow, Flow control, Measurement, Instrumentation, Water costs, Water delivery, Water management(Applied), Water purification, Reservoir storage, Desalination, Water shortage, Wildlife, Habitats, Wildlife conservation, Balance of nature, Recreation.
Identifiers: Whitewater canoeing.

Increased water demands by New York City have spawned the idea of constructing a dam on the Upper Hudson River. Conservationists have studied the probable effects on the Adirondack Forest Preserve. These effects include destruction of unbroken forests as well as the habitat of many Adirondack animals. Also destroyed would be scores of rapids, which provide whitewater canoeing for people in the Northeast. Alternatives to the dam construction involve better use and reuse of New York's existing water supplies. Metering and revision of free schedules which favor heavy users would help reduce demand on such supplies. In addition, millions of gallons of water could be saved by eliminating wastes in plumbing facilities. While conservationists argue for recycling of water, some water engineers contend that present facilities are inadequate to remove some viruses and other pathogens. Desalinization plants are another alternative, but the largest plant in operation, located in Key West, Florida, produces 2.6 million gallons of fresh water per day, compared with New York's approximate consumption of over 2 billion gallons per day. (Ritchie-Florida)
W74-09137

PUBLIC RESPONSE TO DESALTED SEA WATER,
California Univ., Berkeley. School of Public Health.
M. C. Chew, R. N. Mitchell, and W. H. Bruvold.
Journal of the American Water Works Association, Vol 66, No 1, p 8-13, January 1974. 3 illus, 2 photo, 4 tab, 9 ref.

Descriptors: *Desalination plants, *Water resources development, Desalination, Groundwater, California, Surveys, Saline water intrusion.

In a recently conducted state-wide survey in California, seventy-five percent of the respondents were unconvinced of whether a water shortage exists in the state, and a plurality expressed a preference for desalinized ocean water to supplement existing water supplies. The interviews were comprised of four sections. The first dealt with existing sources of supply and the adequacy of these supplies for the next fifteen years. The second dealt with the quality of the water currently being delivered to the respondents' homes. The third dealt with the use of desalted water in the respondents' homes, and the last dealt with the necessity of using desalted water in the community and the ways of making this matter known to responsible governmental bodies. Respondents were also questioned as to the advantages and disadvantages they perceived in the use of desalted water. An advantage frequently seen was that the use of desalted water would preserve ground-water levels, combat salt water intrusion, and allow reservoirs to be kept full for recreation. Disadvantages mentioned were the lack of minerals and fluorides and possible nuclear contamination. (Ritchie-Florida)
W74-09171

PROSPECTIVE COSTS OF ADJUSTING TO A DECLINING WATER SUPPLY: TEXAS HIGH PLAINS,
Economic Research Service, (USDA), Washington, D.C.
W. L. Harman, W. F. Hughes, and J. R. Martin.
Texas AES, Dept. of Agricultural Economics and Sociology, Departmental Technical Report No. 71-3, March 1971. 29 p, 1 fig, 3 tab, 5 ref.

Descriptors: *Agriculture, *Water supply, *Irrigation, *Income, *Efficiencies, Farm prices, Farm units, Water requirements, Dry farming, Land use, Texas, Linear programming.
Identifiers: *Texas High Plains.

The effects of declining water supplies combined with the growing cost-price squeeze had lead to declining income on irrigated farms of the Texas High Plains. While a number of alternatives to maintain income have been assessed, increased farm size appears to be the most promising source of relief. A multiperiod linear programming model is developed to determine minimum starting capital and the subsequent farm size adjustment necessary to obtain and maintain a disposable annual income of $7500, given three water supply situations--good, fair, and poor. The programming models generate capital flow, water use, ownership strategies and farm size changes as farm operations shift from irrigated to dryland farming. An essential requirement to accomplish the adjustment is the ability to generate substantial amounts of internal capital, while maintaining the minimum standard of life. Using 1966 prices, the poor and fair water supplies states are insufficient to generate adequate returns to absorb declining land values and maintain $7500 consumptive levels. For the study area, only 30% of the 6.9 million acres can be converted to dryland farming without sacrificing living standards or net worth. (Schroeder-Wisconsin)
W74-09242

6E. Water Law and Institutions

PROSPECTS OF SCIENTIFIC AND TECHNICAL COOPERATION BETWEEN THE USSR AND THE UNITED STATES IN THE USE OF WATER RESOURCES (PERSPEKTIVY NAUCHNO-TEKHNICHESKOGO SOTRUDNICHESTVA MEZHDU SSSR I SSHA V OBLASTI ISPOL'ZOVANIYA VODNYKH RESURS OV),
I. I. Borodavchenko, and Ye I. Serdyuk.
Vodnyye Resursy, No 4, p 193-196, 1973.

Descriptors: *Water resources development, *Water utilization, *Coordination, *Information exchange, *United States, Governments, Institutions, Planning, Programs, Projects.
Identifiers: *USSR, *International cooperation.

Forms of agreement on scientific and technical cooperative efforts of the USSR and the United States in the field of utilization of water resources are examined. Activities of the Soviet-American commission on scientific and technical cooperation and of Soviet-American working groups of specialists engaged in drafting specific proposals on cooperative programs are discussed. Basic problems necessitating coordinated efforts on the part of the two countries are outlined. (Josefson-USGS)
W74-08703

SANITARY IMPLICATIONS OF SMALL BOAT POLLUTION IN AN ATLANTIC ESTUARY,
Adelphi Univ., Garden City, N.Y. Inst. of Marine Science.
For primary bibliographic entry see Field 5G.
W74-08771

CRITIQUE OF WATER POLLUTION CONTROL ACT,
British Columbia Univ., (Vancouver). Westwater Research Centre.
For primary bibliographic entry see Field 5G.
W74-08774

ENVIRONMENTAL MANAGEMENT AND LOCAL GOVERNMENT,
International City Management Association, Washington, D.C.
S. Carter, M. Frost, C. Rubin, and L. Sumek.
Copy Available from GPO Sup Doc as EP1.23:600/5-73-016, $3.80; microfiche from NIS as PB-232 955, $1.45. Environmental Protection Agency, Socioeconomic Studies Series, Report EPA-600/5-73-016, February 1974. 390 p, 126 tab, 26 ref. EPA Program Element 1HA097, R-801374.

Descriptors: *Surveys, *Environmental control, *Management, *Local governments, Cities, Attitudes, Water quality standards, Taxes, *Institutional constraints, *Water policy, Pollution taxes(Charges), Legal aspects.
Identifiers: *Environmental impact.

Results are presented of a study of environmental management and local government. The study has two main components: (1) a survey of chief executives in cities over 10,000 population and counties over 50,000; and, (2) a series of field studies of local environmental management in Dallas, Texas; Inglewood, California; Miamisburg, Ohio; and the Piedmont Triad Region (Forsyth and Guilford Counties), North Carolina. The major topics include: perception of the definition of environment, priority of environment as a local policy issue, and types of environmental problems facing each local government; adoption of local policy statement on the environment; existence of citizen environmental boards, environmental agencies, environmental sections in master plans, land use controls, other environmental controls, moratoria, environmental quality standards, environmental impact assessment procedures, environmental law suits, tax incentives and penalty charges; factors contributing to and factors creating obstacles to development of environmental programs; and, relations with state and federal agencies. (EPA)
W74-08827

THE ARCHAEOLOGICAL RESOURCES OF THE SALMON RIVER CANYON, A METHODOLOGY STUDY TO DEVELOP EVALUATION CRITERIA FOR WILD AND SCENIC RIVERS,
Idaho Univ., Moscow. Water Resources Research Inst.
E. H. Swanson, Jr.
August 1970. 20 p, 1 fig, 33 ref. OWRR Project B-014-IDA(4).

Descriptors: *History, Federal project policy, *River basins, *Evaluation, Human populations, Project planning, Project purposes, *Idaho, Canyons, Glaciers, Environmental effects.
Identifiers: *Archaeology, *Salmon River, *Wild and scenic rivers, Glacial climates.

The nature and significance of the archaeological resources of the Salmon River Canyon of Idaho are reviewed and discussed as part of a current project of developing criteria for classification of rivers prior to their inclusion into the National Wild and Scenic Rivers System. Archaeologically the canyon has scientific and historic importance because of the evidences of 2 important prehistoric indian cultures who occupied the area and the fact that the Salmon is a proglacial river whose terraces reflect glacial history, which in combination with evidences of early man should reflect man's relationship to the glacial history of the region. The historic inhabitants were Northern Shoshoni and Nez Perce groups who represented 2 major linguistic groups. Current evidence indicates that the area was not inhabited prior to major environmental changes 8000-8500 years ago. The significance of many archaeological sites are discussed. Archaeological sites are nonrenewable scientific and historic resources and therefore have intrinsic value which the federal government has been slow to recognize. Only a very small fraction of archaeological resources in the Columbia Basin have been explored because the government

requires considerable justification for such projects, but does not require justification for exploitive projects such as dams. (Casey-Arizona)
W74-08845

PHOSPHORUS REMOVAL DESIGN SEMINAR, CONFERENCE PROCEEDINGS NO. 1.
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5D.
W74-08846

LAND APPLICATION OF PROCESSED ORGANIC WASTES,
Ministry of the Environment, Toronto (Ontario). Waste Management Branch.
For primary bibliographic entry see Field 5D.
W74-08862

A TANNER LOOKS AT THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972,
Widen (R. J.) Co., North Adams, Mass.
For primary bibliographic entry see Field 5G.
W74-08863

TRENT-WITHAM-ANCHOLME SCHEME AND PROJECT OF THE LINCOLNSHIRE RIVER AUTHORITY,
Lincolnshire River Authority (England). Water Resources Dept.
H. S. Hawkins, and J. D. Arrowsmith.
The Public Health Engineer, No 6, p 255-272, November 1973. 7 fig, 2 tab.

Descriptors: Water resources, *Water demand, *River training, *Control systems, Instrumentation, Pipelines, Design criteria, Reservoirs, Outlets, Pumping plants, Chlorination, *Water quality, Organizations.
Identifiers: *United Kingdom(Lincolnshire).

The organization and establishment of the Lincolnshire River Authority (LRA) is described. River authorities such as this were established under the Water Resources Act of 1963 to continue the function of land drainage and pollution control. A discussion of seven years' progress of the LRA is given. This includes: the Trent-Witham-Anchlome Scheme, public water supply demands, with charts of growth rates, direct demands by industrial and agricultural firms, and increasing demands of the 1970's. In addition, quality considerations were listed as the physical qualities of temperature, color, turbidity, and pH, the chemical qualities of alkalinity, total hardness, non-carbonate hardness, chlorides and dissolved solids, and pollution indicators such as ammoniacal nitrogen, dissolved oxygen, five day biochemical oxygen demand, and four hour permanganate value. The design criteria for this project fall into two categories--'Supply works' and 'Conservation Works'. Also discussed are particular sites such as Short Ferry, Fossdyke Canal, and Torksey Works. Specific problems including pipelines, chlorination, outfall works, and reservoir facilities are detailed. (Prague-FIRL)
W74-08882

RECENT DEVELOPMENTS ON WATER POLLUTION LEGISLATION,
Environmental Protection Agency, Boston, Mass. Permits Branch.
For primary bibliographic entry see Field 5G.
W74-08895

WATER LAW AND THE HYDROLOGIC CYCLE: A TEXAS EXAMPLE,
Texas Tech Univ., Lubbock. Dept. of Geography.
O. W. Templer.
Water Resources Bulletin, Vol 9, No 2, p 273-283, April, 1973. 2 fig, 39 ref.

Descriptors: *Water law, *Legislation, *Texas, Riparian rights, Groundwater, *Hydrologic cycle, *Water rights, Water utilization, Water wells, Water yield.

The law divides water in the cycle into several different classes. Each is treated separately and generally without consideration of interconnections existing within the cycle. Different rules of law have arisen concerning the ownership and use of each legal class. Under Texas law several classes of surface and ground water are recognized, and weather modification efforts bring yet another class, atmospheric moisture, under consideration. It is instructive to follow water moving through the hydrologic cycle in the Nueces River basin, Texas, as a framework for discussing the substantial interconnections between the various legal classes of water and the difficulties that arise from attempts to apply different rules of law to each class. Strictures imposed by Texas water law can seriously interfere with coordinated, efficient use and management of water resources, as evidenced by the Nueces River basin. Well-recognized, existing water rights in the several phases of the hydrologic cycle make change of these institutional constraints difficult to achieve. (Skogerboe-Colorado State)
W74-08930

STATE EX REL. LUDWIG V. CITY OF BEMIDJI (ACTION FOR INJUNCTION AND DAMAGES AGAINST CITY FOR POLLUTING RIVER).
212 N.W.2d 876 (Minn. 1973).

Descriptors: *Minnesota, *Judicial decisions, *Water quality control, *Legal aspects, *Permits, Regulations, Standards, Water law, State governments, Administrative agencies, Environmental effects, Legislation, Ecology, Water resources, Appeals, Water policy, Natural resources, Pollution prevention, Pollution control, Pollution abatement, Municipalities.

A proceeding in the Supreme Court of Minnesota was brought by residents of a county to enjoin a city from polluting a river and to recover damages arising from the nuisance maintained by the city. The trial court dismissed the injunction suit and the plaintiffs appealed. The Supreme Court held that notice of hearing concerned with adoption of pollution standards was insufficient to confer jurisdiction upon the Pollution Control Agency to revoke a permit previously issued to the city. The Court further held that the city could not adequately prepare for a hearing which was designed to enforce a standard not yet adopted, and that failure to afford the city an individual hearing to resist the proposed order constituted a violation of the statute which operated to deprive the Pollution Control Agency of its jurisdiction over the city. Absent proper, prior notice that a hearing would be conducted to establish pollution standards, adopt regulations and revoke permits for sewage disposal in interstate waters, the city could not be amenable to the agency's jurisdiction. The judgement was affirmed. (Silber-Florida)
W74-09121

BLANEY V. RITTALL (ACTION ATTACKING PERMIT GRANTED TO CORPORATION WHICH ALLOWED THE BUILDING OF A WHARF).
312 A.2d 522 (Me. 1973).

Descriptors: *Maine, *Judicial decisions, *Legal aspects, *Permits, *Legislation, Standards, Environmental effects, Administrative agencies, State governments, Environmental protection, Estuaries, Wetlands, Natural resources, Land management, Land development, Water policy, Administrative decisions, Legislation, Ecology, Water resources, Water resources development, Coasts.

A proceeding in the Supreme Judicial Court of Maine was brought by an adjoining landowner under the wharves and weirs statute and the Wetlands Control Act attacking a permit granted by the Board of Selectmen of Boothbay Harbor to a corporation purporting to allow it to construct a wharf on its property. The Supreme Judicial Court held that the corporation was a proper appellant and, that because the corporation had failed to file a description or sketch of the affected land with its permit, the permit issued under the Wetlands Control Act was invalid. The corporation filed two applications and after notice and hearing, the municipal officers, with approval from the Wetlands Control Board, issued one permit authorizing the applicant to alter coastal wetlands. This action by the governmental agency was subject to appeal. The trial court found that an incomplete recording of the permit occurred which did not satisfy the statutory requirement and ruled that the permit was therefore void. The Wetlands Act requires that a license be approved if one seeks to alter or drain or deposit sanitary sewage on a coastal wetland, swamp, marsh, bog, etc. This judgement was thus affirmed. (Silber-Florida)
W74-09122

IT'S ABOUT TOO LATE FOR TAHOE,
For primary bibliographic entry see Field 5G.
W74-09124

WATER POLLUTION--GOVERNMENTAL ACTIVITIES IN BROWARD COUNTY,
For primary bibliographic entry see Field 5G.
W74-09125

CONTROLLING POLLUTION,
Grove City Coll., Pa. Dept. of Economics.
For primary bibliographic entry see Field 5D.
W74-09128

SUSQUEHANNA RIVER BASIN COMPACT.
Pa. Stat. Ann., secs. 820.1-820.8 (1968).

Descriptors: *Pennsylvania, *Interstate compacts, *Legislation, *Water law, *Water resources development, Water planning, Water development, Water management, Water policy, Interstate rivers, Cooperation, Coordination, State governments, Water rights, Equitable apportionment, Rivers, River basins, River basin development, Watersheds, Watershed protection, Inland waterways, Navigable waters, Water distribution, Water demand, Water supply, Water utilization.

The state's participation in the Susquehanna River Basin Compact (Compact) is authorized. The participants recognize their joint responsibility in the conservation, utilization, development, management and control of the water resources of the basin under a comprehensive multiple purpose planning effort which will bring the greatest benefits and produce the most efficient service in the public interest. One section of the component recognizes the interrelated interests and rights of the many sovereignties through which the river flows and the importance of inter-governmental cooperation and the establishment of a single administrative agency to effectively and economically direct the future of the area's water resources. Another important provision to all users of water and of water related facilities without regard to political boundaries. The Compact grants generous administrative powers to the agency in order that its purposes and intentions may be carried out with the maximum efficiency and in the best public interest. (Silber-Florida)
W74-09129

DITCH V. HESS (ACTION TO RESTORE FREE FLOW OF SURFACE WATER).
212 N.W.2d 442 (Ia. 1973).

Descriptors: *Natural flow doctrine, *Adjudication procedure, *Surface runoff, *Judicial decisions, *Obstruction to flow, Preferences(Water rights), *Iowa, Surface drainage, Riparian rights, Conjunctive use, Culverts, Water sources, Legislation, Relative rights, Remedies.

Plaintiff brought action to restore free flow of surface water from her land and to recover for crop damage which allegedly resulted from interference with such flow. The court held that plaintiff, as owner of the upper, dominant estate had a legal and natural easement in the lower, servient estate for drainage of surface water and the servient owner could not interrupt or prevent the natural flow or passage of waters to the detriment of the dominant owner. The court further stated the dominant owner could cast additional surface water upon the servient estate, as long as no substantial damage is done. The defendants, to whom a strip of land was conveyed for construction of an access road were entitled to maintain the roadway in a useable condition, but when the road is raised above the adjoining land, facilities must be constructed to permit free passage of water. Since defendants removed the drainage pipe from their access road, thereby causing damage to adjoining landowner's crops from the surface water remaining, an award of damages was justified against defendants and the drainage pipe was ordered restored. (Sutton-Florida)
W74-09130

JENKINS V. PEDERSEN (ACTION BY ADJOINING PROPERTY OWNER AGAINST NEIGHBOR FOR DIVERTING SURFACE WATER ONTO PLAINTIFF'S PROPERTY).
212 N.W.2d 415 (Ia. 1973).

Descriptors: *Iowa, *Judicial decisions, *Legal aspects, *Obstruction to flow, *Groundwater barriers, Riparian rights, Streamflow, Natural flow doctrine, Water policy, Water management, Diversions, Structures, Dams dikes, Water law, Flow control, Water control, Drainage, Runoff, Water distribution, Flooding.

A proceeding in the Supreme Court of Iowa was brought by property owners against adjoining property owners who allegedly diverted surface waters so they drained onto plaintiffs' property. The trial court awarded damages and granted a mandatory injunction. The defendants appealed and the Supreme Court reversed, holding that the jury's finding that the dike constructed by the adjoining owners did not contribute to the plaintiffs' damages was error. Furthermore, the trial court's granting of the mandatory injunction requiring removal of the dike was an abuse of discretion. Where surface water has a fixed and certain course, its flow cannot be interrupted to injury of an adjoining proprietor and equity will enjoin the obstructing of such natural flow of water when necessary to prevent irreparable harm. But a showing of irreparable harm is necessary to invoke the injunctive jurisdiction of the court. (Silber-Florida)
W74-09131

RAY V. RANOWSKY (INJUNCTION AGAINST CONSTRUCTION OF DRAIN IN WATERSHED).
210 N.W. 2d 810 (Mich. Ct. App. 1973). 5 p.

Descriptors: *Michigan, *Watersheds(Basins), *Constitutional law, *Assessments, *Drainage systems, Legislation, Right-of-way, Judicial decisions, Legal aspects, Construction costs, Water law, Watershed management.
Identifiers: Statute of limitations, Laches.

Residents of a Michigan watershed sought to enjoin the county drain commissioner from proceeding with construction of a watershed drain and assessment of the residents for the cost of the project. The drain commissioner is charged by Michigan law with determining the necessity for any such project, and plaintiffs argued that the cost of the project was an element in making that determination, which the commissioner had failed to consider. The Court of Appeals held that a required post-approval public meeting was the proper forum to review the benefits and cost of the project, and thus not an element of the determination of necessity. Plaintiffs argued that such a procedure would be a denial of due process, leaving them recourse only to challenge their individual assessments following approval of the plan. The Court concluded that special assessments are constitutional if founded upon special benefits which accrue to the landowners from the improvement. The Appellate Court then refused to overrule the finding of the trial court that the plaintiffs' land had benefitted in its use and resale value, and that the benefits were directly attributable to the drainage project. (Ritchie-Florida)
W74-09132

WEATHER MODIFICATION.
Pa. Stat. Ann., secs. 1101 thru 1118 (1968).

Descriptors: *Pennsylvania, *Artificial precipitation, *Cloud seeding, *Regulation, *Conservation, Water resources development, Legal aspects, Water shortage, Administrative agencies, Administration, Legislation, State governments, Adoption of practices, Coordination, Public health, Safety, Research and development, Aircraft, Rain, Dry seasons, Legal aspects, Decision making, Planning, Political aspects, Water resources.
Identifiers: *Administrative regulations, *Licenses, Notice.

The public health and safety require scientific experimentation to increase natural precipitation in order to develop, conserve, and to protect the natural water resources of the state of Pennsylvania. The statute creates a Weather Modification Board to advise the Department of Agriculture on these matters. A license is required by the department before any endeavor takes place to cause condensation or precipitation. It is unlawful to possess any cloud seeding equipment unless the possessor has a license or he is under contract with a person who has such a license. The statute sets forth the information to be on the application, including the application fee and insurance coverage. Each license must be renewed annually. A person who owns cloud seeding equipment, but who does not want a license must nevertheless register with the board. A published notice of intention will include the name and address of the licensee, the nature and object of the intended operation, and the area and time where the operation will be conducted. These provisions do not have to be compiled with if there is an emergency such as the need to extinguish fires. The county commission may also request such action to relieve a drought. A violation of this statute is a misdemeanor, and any pilot who wrongfully partakes in such a project may lose his license for five years. (Sperling-Florida)
W74-09133

WHEELING CREEK WATERSHED PROTECTION AND FLOOD PREVENTION DISTRICT COMPACT.
Pa. Stat. Ann., secs. 819.1-819.3 (1967).

Descriptors: *Pennsylvania, *Interstate compact, *Legislation, *Flood control, *Water resources development, Flood prevention, Water planning, Water development, Water management, Water policy, Interstate rivers, Cooperation, Coordination, State governments, Water rights, Watersheds, Water conservation, Wildlife conservation, Recreation, Reservoirs, Dams, Fishlife, Agricultural conservation, Administrative agencies.

The Wheeling Creek Watershed Protection and Flood Protection District Compact is created. The Compact in turn establishes a district to carry out the intent and purposes of the Compact. The district has the responsibility of planning and implementing improvements for flood control and flood prevention within its jurisdiction as well as applying for federal funds and other assistance in carrying out plans for works and improvements. It shall also be the purpose of the act that the district engage in public fish and wildlife conservation and recreational development, including the operation and construction of all necessary facilities. Furthermore, the Compact authorize the operation and maintenance of reservoirs and dams, and the allocation and control of all phases of agricultural conservation in cooperation with the United States Department of Agriculture. The district shall assure landowners and water users such water rights as they have acquired, as well as cooperating with soil conservation districts and all other state, local and federal agencies in promoting the most efficient methods of carrying out the purposes of the Compact. (Silber-Florida)
W74-09134

WATER DISCHARGE PERMIT PROGRAM BEGINS DESPITE LACK OF EFFLUENT STANDARDS,
For primary bibliographic entry see Field 5G.
W74-09138

ARCTIC PASSAGE--LEGAL HEAVY WEATHER,
D. E. Milsten.
Orbis, Vol 15, No 4, p 1173-1193, Winter 1972.

Descriptors: *Arctic, *Arctic Ocean, *Natural resources, *Water resources development, *Legal aspects, Water law, Polar regions, Boundary disputes, Water rights, Boundaries, Navigable waters, Developed waters, International law, International commissions, International waters, Commercial fishing, Water quality, Water pollution control, Mineralogy, Land development.

With the successful navigation of the Arctic ice pack through the Northwest Passage by the specially equipped icebreaking oil tanker, S.S. Manhattan, the prospect of considerable public and private development has again risen. A vast wealth of minerals is known to exist in the Arctic. Competition in the development of these resources raises the potential for political challenge between the nations interested in Arctic development and the use of the common resource---the ocean. Of major concern is the use of certain waterways as access routes for rapidly expanding developmental situations. Also, the ocean areas themselves are subject to development efforts, as seen in the growing importance of continental shelf resources and fishing. The question of pollution in the seas is a growing concern for many nations. In 1970 Canada enacted two measures which extended its territorial waters to twelve miles and asserted control over Arctic waters up to 100 miles from the mainland for the purpose of preventing oil pollution, while establishing standards of performance for vessels transiting Arctic waters. Disputes over sovereignty and international law will have to be resolved before Arctic development can be realized. (Silber-Florida)
W74-09139

A BILL TO CREATE A MARINE RESOURCES CONSERVATION AND DEVELOPMENT FUND; TO PROVIDE FOR THE DISTRIBUTION OF REVENUES FROM OUTER CONTINENTAL SHELF LANDS; AND FOR OTHER PURPOSES.
Senate Bill 2672, 93d Cong, 1st Sess (1973). 8 p.

Descriptors: *Federal government, *Legislation, *Coasts, *Natural resources, *Continental shelf, *Conservation, Marine fisheries, Oceans, Water pollution, Water pollution control, Government

finance, Aquaculture, Erosion, Shores, Shore protection, Recreation, Flood protection, Oceanography, Regional development, Research and development, Mineralogy, Exploration.
Identifiers: *Marine Resources Conservation and Development Act, *Outer Continental Shelf Lands Act.

This bill would amend the Outer Continental Shelf Lands Act. All rentals, royalties or other sums paid in connection with any lease on the Outer Continental Shelf which is attributable to that portion of the Outer Continental Shelf adjacent to any state or that portion to which a state by interstate compact has limited itself shall be deposited as follows: 70% in a special fund to be known as the Marine Resources Conservation and Development Fund (MRCDF); and 30% to the adjacent states to be used for conservation purposes, including the prevention and abatement of environmental pollution in the coastal areas of the state. The MRCDF shall be available for marine resources conservation and development programs for fresh and salt water pollution control, fresh and salt water aquaculture, prevention of beach and shoreline erosion, hurricane and flood prevention, aid to sea grant colleges, fishery development, recreational facilities and oceanographic research and development. The MRCDF shall also be used to establish Regional Environmental Review Boards to inspect the exploration, production and transportation of minerals off the coast of their respective regions. (Ritchie-Florida)
W74-09140

INDUSTRIES WIN FEW CONCESSIONS AS POLLUTION PERMIT PLAN MOVES ON SCHEDULE,
J. R. Wagner.
National Journal, Vol 3, p 932-938, May 1, 1971.

Descriptors: *Water law, *Permits, *Water quality control, *Water pollution control, *Industrial waste disposal, Regulations, Wastewater disposal, Legal aspects, Water pollution sources, Water policy, Environmental sanitation, Navigable waters, Federal government, Standards, Administrative agencies, Impaired water quality, Sewage disposal, Water permits, Water utilization, Planning, Water resources development, Water management, Governments, Water treatment, Pollution abatement.

The Environmental Protection Agency and the Army Corps of Engineers are enforcing the July 1, 1971 date as the deadline for all industries discharging waste into navigable waters to apply for federal permits to continue their discharges, even though the affected industries do not have all the regulations necessary to fully comply. Without more legislation (Refuse Act) agency officials claim full authority to launch the permit program and to enforce it. If polluting industries fail to comply with the program's requirements, they can expect court action. The new regulations appear to have been written so as to withstand possible legal challenges to the permit program. Fish and wildlife protection are given special emphasis and attention. Vessels will not be required to apply for permits. Municipal systems of liquid waste discharge are not included within the 1899 Refuse Act, but industries are liable for criminal sanctions if they attempt to discharge their wastes through municipal sewage systems. Effluent guidelines appear to be the most important of the regulations as they define the degree of pollution allowed to industries in the major categories. (Silber-Florida)
W74-09141

WATERCRAFT: MARINE TOILETS.
Mo. Stat. Ann., tit. 19, sec. 306.260 (1972).

Descriptors: *Missouri, *Legislation, *Sewage, *Sewage disposal, Sewage treatment, Septic tanks, Sewage lagoons, Water pollution, Water pollution sources, Water quality, Mississippi River, Missouri River, Boats, Equipment.
Identifiers: *Interstate commerce, Marine toilets.

All marine toilets on any boat, operated upon the waters of Missouri, shall be so constructed and operated as to contain all sewage aboard the boat, and not to discharge any sewage into the waters directly or indirectly. All sewage when removed from any boat shall immediately be placed in an approved septic tank, sanitary lagoon or sewage treatment system. This statute does not apply to boats engaged in interstate commerce on the Missouri and Mississippi rivers. (Ritchie-Florida)
W74-09143

LITTLE CALUMET RIVER FLOOD CONTROL COORDINATING COMMISSION.
Ill. Pub. Acts 1973, ch. 78-782, sec 1, to be codified as Ill. Stat., ch. 19, sec 112.11 to 112.17.

Descriptors: *Legislation, *Rivers, *Flood control, Flood protection, Streamflow.
Identifiers: *Flood Control Act.

The Little Calumet River Flood Control Coordinating Commission is created. The commission shall examine and study all existing and future plans and policies in relation to flood control in and along the Little Calumet River and its tributaries. The commission shall coordinate the various programs of federal and state agencies involving flood control in and along the river and its tributaries, excluding control of funds for dredging, diking, channelization or other such flood control measures. The commission shall report findings, conclusions and recommendations, including drafts of suggested legislation to the General Assembly no later than March 1 of each year. The commission may employ and fix the compensation of such staff as it considers necessary and desirable. (Silber-Florida)
W74-09144

LANGFORD V. KRAFT, DOWNING AND WOOTEN ENTERPRISES V. KRAFT (DAMAGE FROM FLOOD RUNOFF).
498 S.W.2d, 42-52 (Texas 1973).

Descriptors: *Flooding, *Surface runoff, *Storm runoff, Water control, Drainage system, Natural flow, Diversion, Texas.

An action was taken by an adjoining landowner against real estate developers and their engineer for damages and for an injunction with respect to the flooding of the owner's land by discharge from the storm sewer system. The district court issued a temporary injunction and the engineer appealed from the ruling. The court of appeals held the trial court did not abuse its discretion in granting the temporary injunction, that the action against the engineer was properly maintainable in the county in which the alleged trespass occurred and that the statute pertaining to venue of ordinary injunction suits was not applicable. The court held that the developer's actions causing water runoff to adjoining land caused damage in violation of a statute prohibiting diversion or impounding of natural flow of surface waters in a manner that damages the property of another. Once the violation is shown, the doctrine of balancing of equities is inapplicable in determination whether to grant an injunction. (Daniels-Florida)
W74-09145

OVER 40 YEARS OF REGIONAL SERVICES,
Hartford Metropolitan District, Water Bureau, Conn.
G. Gufstafson, and H. Phillips.
Journal of American Water Works, Vol 65, No 4, p 243-247, April 1973. 4 p, 4 fig, 3 photo, 1 ref.

Descriptors: *Connecticut, *Water districts, *Water distribution(Applied), *Water supply, *Filtration, Reservoirs, Recreation facilities.

The water district which serves Hartford County, County is described. The district is a municipal corporation formed in 1930. The district supplies water to about 400,000 people within the twenty mile radius provided for in its charter and also collects and treats sewage for the area. It has four pollution control plants which utilize the activated-sludge process. There are six active water-supply reservoirs within the district and also a compensating reservoir with a capacity of three billion gallons. The compensating reservoir has never been used as a water supply reservoir. It was originally built to compensate well owners during periods of low flow, but now it also serves as a recreational area for swimmers, boaters, and fishermen. Although the district's raw water is low in turbidity and color, the district decided long ago to adopt filtration to ensure the safest and clearest water possible. The slow sand process is used in the older facilities but the new plants have gone to the rapid sand process due to its ease of automation, reduced space requirements, and lower construction costs. (McKnight-Florida)
W74-09146

EFFECTS OF PENDING FEDERAL DRINKING-WATER LEGISLATION,
C. Atkinson, Jr.
Journal of American Water Works Association, Vol 65, No 9, p 579-581, September 1973. 1 photo.

Descriptors: *Potable water, *Legislation, *Standards, Utilities, Industries, Water quality control, Water quality standards.

Changes in drinking-water standards and what these changes are going to mean to the water utility industry are discussed. A public affairs committee was established with the prime purpose to see that officers and members of the American Water Works Association are informed on matters affecting water and related subjects. All bills now before Congress provide for greater supervision and control of drinking water than in the past. The bills provide that the federal government is to conduct and promote research, technical assistance and training of water-supply personnel. The conclusion reached by the committee is that the proposed safe-drinking-water legislation will, if passed, have far-reaching effects on state and local programs and on the water industry. (Daniels-Florida)
W74-09147

WATER IMPROVEMENT COMMISSION.
Me. Rev. Stat. Ann., Vol 16, tit 38, secs 361-367 (Supp. 1973).

Descriptors: *Maine, *Legislation, *Water pollution control, *Environmental control, Sewage, Wastes, Industrial wastes, Tidal waters, Water quality standards, Inter-agency cooperation.

Maine's Board of Environmental Protection was established to represent manufacturing interests, the public generally and conservation interests. It will exercise the police power of the State to control, abate and prevent the pollution of the air, waters, coastal flats and provide for the best use of the natural resources of the State of Maine. The Board shall consult and advise municipal authorities on sewage and industrial wastes; make such regulations as are reasonably necessary; conduct hearings and establish a continuous planning process in cooperation with state, federal and regional agencies consistent with the Federal Water Pollution Control Act. It shall establish standards for fresh, tidal and marine water protection. (Daniels-Florida)
W74-09148

PROTECTION AND IMPROVEMENT OF WATERS.
Me. Rev. Stat. Ann., Ch. 16, Tit. 38, Sec. 451-454 (Supp. 1973).

Descriptors: *Maine, *Water quality control, *Legislation, Navigable waters, Surface water, Law enforcement, Water quality standards.
Identifiers: Enforcement.

This is the enforcement provision of the waters and navigation laws of the state of Maine. The Statute provides that after adoption of any classification by the legislature for surface waters, it is unlawful for any person or firm to dispose of sewage or any industrial waste in such manner as will after diffusion and mixture with the receiving waters lower the quality of said waters below the minimum requirements. The purpose of these mixing zones is to allow a reasonable opportunity for dilution, diffusion or mixture of wastes with the receiving waters before the receiving waters below or surrounding a discharge will be tested for classification violations. Where no mixing zones have been established it shall be unlawful for any person or firm to dispose wastes into any classified waters that will lower the quality of waters below the minimum standards, notwithstanding any licenses which may have been granted or issued. Provisions for revocation, modification or suspension of licenses for mixing zones are included within this enforcement section. (Daniels-Florida)
W74-09149

NATURAL AND SCENIC RIVERS SYSTEM.
N.C. Gen. Stat., secs. 113A-30 through 113A-43 (1971).

Descriptors: *North Carolina, *Scenic easements, *Aesthetics, *River systems, Wild rivers, Administrative agencies, Boundaries(Property), River flow, Social aspects, Economic aspects, Land management.

North Carolina has adopted a policy aimed at the retention of natural and senic conditions in the state's rivers. This is to be accomplished by maintaining them in a free-flowing state and protecting their water quality. For inclusion into the natural and scenic river system the river or river segment must meet the following criteria: the length must be greater than one mile; the boundaries on the shoreline must not be less than twenty feet nor more than 320 acres (except by donation) of land per mile; water quality must be essentially unpolluted at present; the water flow shall be sufficient to assure a continuous flow, and not be subject to withdrawal or regulation that would substantially alter the natural ecology of the stream; and, public access must be limited in keeping with the purpose of this statute. The administration of the statute is the responsibility of the Department of Conservation and Development. The Department also has authority to plan, develop, and acquire land. It can either acquire complete ownership of the land or scenic easements thereon. Anyone who donates land or an easement is entitled to a charitable deduction under North Carolina law. (Sperling-Florida)
W74-09150

WHAT CONSTITUTES PUBLIC WATERWAYS AND RIGHTS.
Miss. Code Ann., sec. 51-1-4 (Supp. 1973).

Descriptors: *Mississippi, *Water rights, *Water policy, Navigable waters, Riparian rights, Public rights, Recreation, Channels, Water zoning, Water allocation(Policy).
Identifiers: Navigability tests.

Criteria are established as to what constitutes public waterways and the subsequent rights thereon. Such portions of all natural flowing streams having a length of not less than five miles and an average depth along the thread of the channel of three feet for ninety consecutive days in the year and an average width at low water of not less than thirty feet, shall be public waterways of the state of Mississippi on which citizens of this state or any other state shall have the right of free transport and the right to fish and engage in water sports. Except as otherwise provided by law nothing herein contained shall authorize any person, firm or corporation utilizing said public waterways to disturb the banks or beds of such waterways or discharge any object or substance into such waters or upon or across the lands adjacent thereto. This section shall not be construed to prohibit the construction of dams or reservoirs in the manner authorized by law, or to amend or repeal any law relating to pollution or water conservation. This section does not apply to manmade waterways. (Silber-Florida)
W74-09151

DREDGING OF OYSTER SHELLS FROM PUBLIC LAND UNDER CHESAPEAKE BAY AND POTOMAC RIVER.
Ann. Cd. of Md., art. 66C, sec. 13B (1970).

Descriptors: *Maryland, *Legislation, *Administrative agency, *Dredging, Navigable waters, Public lands, Decision making, Tidal waters.
Identifiers: Coastal zone management.

A permit is required to remove sand, gravel, or any other resources from the public lands under navigable waters of the Chesapeake Bay and the Potomac River. In the application for the permit, the location of the land where the resources are to be taken should be noted. Required survey stakes should be driven, where possible, at definite corners of the tract. The application for the permit must be accompanied by a ten dollar fee. Persons who dredge oyster shells from the public lands under the navigable waters of the aforementioned bodies of water must leave approximately one hundred feet of bottom untouched for every one thousand feet dredged. These untouched strips will be maintained and it will be unlawful for any person to destroy or damage them by dredging or other means. (Sperling-Florida)
W74-09152

CONSERVATION AND LAND DEVELOPMENT.
Pa. Stat. Ann., secs. 5001-5013, p 48-51 (1967).

Descriptors: *Pennsylvania, *Legislation, *Water management, *Conservation(Natural resources), *Land management, Land development, Erosion control, Streams, Beaches, Shores, Recreation, Wildlife, Forests, Land use, Watershed protection, Flood plains, Marshes, Groundwater, Administrative agencies.

Pennsylvania's Open Space Lands policy is established. It is the legislative intent and purpose to clarify and broaden the existing methods in which land may be preserved or acquired for open space uses. The state finds that it is an essential policy to meet the needs for recreation, amenity and conservation of natural resources, including farm lands, forests and a pure and adequate water supply. The Department of Forests and Waters is authorized to acquire interests in or purchase real property to protect and conserve water resources and watersheds, forests and timberlands, and to protect existing or planned park, forest, wildlife preserve or other recreation and conservation sites by controlling the use of contiguous or nearby lands in order to protect the senic, aesthetic or watershed values of the sites. The Department is also charged with the responsibility of protecting and conserving the soils, beaches, streams, flood plains and marshes of the state and protecting and enhancing their scenic, historic, geologic, and botanic importance. (Silber-Florida)
W74-09153

2 OBJECTIVES 4 ACCOUNTS,
Water Resources Council, Washington, D.C.
W. D. Fairchild.
Water Spectrum, Vol 5, No 4, p 22-27, 1973. 4 photo, 1 chart.

Descriptors: *Planning, *Water resources development, *Water policy, *Water supply, Inter-agency cooperation, Multi-purpose projects, Political aspects, Social function.
Identifiers: Water Resources Council.

The revised Principles and Standards for water planning, issued by the U.S. Water Resources Council are discussed. The main objective was to place environmental concerns on an equal basis with economic development. By considering national economic development, environmental quality, regional development and social well being, an opportunity to fully evaluate projected effects and tradeoffs of alternate plans is provided for. The Principles and Standards reflect that the country's values are changing. Under the new principles, the public's role will be stimulated, as plan formulation will require public participation to be sought early and continually throughout the process. Implementation of the Principles and Standards will push progress towards defining positive ways of identifying effects in a descriptive way. No comment is given on cost considerations as changes in such provisions will be through legislative actions. (Sutton-Florida)
W74-09154

DIVERSION OF WATER.
S.C. Code Ann., sec. 59-16 (1970).

Descriptors: *South Carolina, *Water law, Rivers, Bays, Diversion, Routing, Diversion structures, Consumptive use, Structures, Canals, Conduits, Ditches, Electric powerplants.

The South Carolina Public Service Authority is authorized to divert water from the Sampit River, Penny Royal Creek and their tributaries for use in connection with the operation of an electric generating plant to be constructed between the Sampit River, Penny Royal Creek and Winyah Bay and to discharge such water, or so much thereof as is not consumed into Winyah Bay. Such diversion shall not exceed two thousand cubic feet of water per second each day, and may be accomplished by canals, conduits, ditches, pipes or other proper structures. This provision shall not be construed to waive the laws as to pollution control, and shall not affect the right of any person to recover damages sustained as a result of the diversion of water permitted by this section. (Ritchie-Florida)
W74-09155

PUBLIC WATER SUPPLY, SEWERAGE AND SOLID WASTE DISPOSAL SYSTEM.
Md. Code Ann., art. 43, sec. 387C (Supp. 1973).

Descriptors: *Maryland, *Administrative agencies, *Adoption of practices, *Coordination, Water conveyance, Waste water disposal, Solid waste.

A county plan for the public water supply, sewerage, and solid waste disposal systems will delineate those areas where community water supply systems must be provided and where individual water supply systems may be installed and used in the interim although in some areas individual water supply systems may be installed and used for an indefinite period. Each plan will also show where community sewerage systems must be provided as well as where individual systems can be used. Adequate sewage treatment facilities are required to prevent the discharge of inadequately or untreated sewage or other liquid waste into any waters. In addition every county plan will establish procedures for acquiring necessary rights-of-way or easements for the community water supply, or sewerage and waste acceptance and disposal systems. A time schedule and proposed methods of financing the construction and operation, as well as the estimated cost of each system are to be included in the plan. Each county plan must indicate the source of the water

supply, the amount withdrawn from waters of the state of Maryland, and the quantity and quality of wastes to be discharged into the waters of the state. (Sperling-Florida)
W74-09156

COUNTY SEDIMENT CONTROL PROGRAMS.
S.C. Code Ann., secs. 63-195.101 through 63-195.106 (1971).

Descriptors: *South Carolina, *Legislation, Erosion, Siltation, Sedimentation, Sediment control, Soil conservation, Soil erosion.

Any county in South Carolina may establish a sediment control program upon adoption of a resolution by the body authorized to levy taxes within the county, and shall then designate the proper agency to administer and enforce the program. In counties establishing such a program, no minerals shall be commercially mined nor shall ground be broken for construction until a grading permit is obtained. Plans which will outline methods to control erosion and siltation must be submitted and approved prior to obtaining a permit. Construction of single-family residential dwellings and agricultural buildings is exempted from the above provision. Fines may be imposed for violation of the above provisions and the soil and water conservation districts and the governing body of each county are empowered to obtain injunctive relief for violations of any grading plan previously submitted. (Ritchie-Florida)
W74-09157

POLLUTION CONTROL FACILITIES.
S.C. Code Ann., secs. 63-195.51 through 63-195.65 (1971).

Descriptors: *Air pollution, *South Carolina, *Pollution abatement, Financing, Taxes, Waste disposal, Industrial wastes, Cities.

South Carolina has enacted statutes governing the financing and letting of contracts for construction of pollution control facilities, which are any facilities designed for the elimination, mitigation or prevention of air or water pollution. The facilities include all things which are required to collect, treat and thereafter dispose of all waste of any sort originating in or about any industrial enterprise. Prior to undertaking the financing of any pollution control facility, a finding is required by the Pollution Control Authority of South Carolina that the pollution control facilities are necessary and that the design will result in the elimination, mitigation and prevention of air or water pollution. Counties and municipalities are empowered to enter into agreements with any industry to construct and thereafter operate, maintain and improve pollution control facilities, to enter into loan agreements with such industry and to issue tax exempt bonds to defray the cost of constructing or enlarging any pollution control facilities. (Ritchie-Florida)
W74-09158

WATER CONSERVATION.
La. Rev. Stat. secs. 38:2552 thru 38:2907 (Supp. 1973).

Descriptors: *Louisiana, *Sewage disposal, *Water districts, Soil conservation, Land use, Recreation facilities.

The Bayou D'Arbonne Lake Watershed District shall be a political subdivision of the state of Louisiana and shall have as its purpose the conservation of soil and water, and the development of the natural resources and wealth of the district for sanitary, agricultural and recreational purposes. The Bossier Parish police jury is authorized to regulate and control the types of private sewage disposal systems or other private facilities that may discharge pollutants into the waters within the Cypress-Black Bayou Watershed. Other statutes are suspended insofar as they limit the size of park and recreational facilities authorized for erection and construction by the Board of Commissioners of the Black Bayou Watershed District. The Board is urged to take steps necessary to take advantage of federal financial assistance that is or may become available. The Jackson Parish Watershed District shall have for its purpose the conservation of soil and water and the development of the natural resources and wealth of the district. The district shall have all the powers, rights, privileges and immunities of a public corporation. (Napolitano-Florida)
W74-09159

RED RIVER WATERWAY.
La. Const. Art. 14 sec 30.5 (Supp. 1973).

Descriptors: *Louisiana, *Navigable rivers, *Governmental interrelations, Easements, Right-of-way, Land use, Capital costs, Tax rates, Bonds, Leases, Water districts.
Identifiers: Red River, Atchafalaya River.

The Louisiana Constitution creates the Red River Waterway extending from the vicinity of the confluence of Red River with Old River and the Atchafalaya River northwestward in the Red River Valley to the state boundary. This navigable waterway system is created for the purpose of establishing, operating, and maintaining cooperation with the federal government. The state legislature is empowered to create the Red River Waterways District which shall be the body politic. The legislature shall prescribe the jurisdiction, objects, purposes, power and authority of the district. In addition to other powers which the legislature may confer upon it, the district governing body shall be authorized: to levy an annual tax not to exceed 1.5 miles on all taxable property within the district for purposes of capital outlay including cost of acquisition of rights-of-way and compensation; to fund bonds for the accomplishment of capital outlay; to expropriate property; to acquire by purchase, donation, lease or otherwise, and to hold and use any property real, personal or mixed, tangible or intangible, or any interest therein necessary or desirable for carrying out the objects and purposes of the district; and to create and establish port sub-districts within the confines of the district. (Napolitano-Florida)
W74-09160

HAYES V. STATE (FENCING ON NAVIGABLE WATERS).
496 S.W. 2d 372-375 (Ark. 1973). 4 p.

Descriptors: *High water mark, *Riparian rights, *Navigable rivers, River beds, Judicial decisions, Arkansas, Riparian land, Ownership of beds, Boundaries(Property).

The case involved the defendants', riparian land owners, right to erect a fence. The defendants' right was dependent on two determinations, one being whether the river was navigable at that point and the other being the location of the ordinary high water mark. The Supreme Court of Arkansas affirmed the finding that the river was navigable but reversed the order concerning the ordinary high water mark. The Court said that high water mark was to be determined by examining the bed and banks to ascertain where the presence of the water was so usual and continued as to mark upon the beds a character distinct from the bank in respect to vegetation and the nature of the soil itself. This reversal allowed the defendants to maintain their fence. (Sears-Florida)
W74-09161

NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION.
R.I. Gen. Laws Ann., secs. 46-16-1 through 46-16-1.3 (Supp. 1972).

Descriptors: *Legislation, *Rhode Island, *Interstate compacts, *Interagency cooperation, Water pollution abatement, Cooperation.

The state of Rhode Island is authorized to reaffirm its support and participation in the cooperative approach to the abatement and control of water pollution as embodied in the New England interstate water pollution control compact. The New England interstate water pollution control commission shall develop programs in view of increasing population concentrations, the growing needs of industry and agriculture for water of reasonable quality, and the quality requirements of water-based recreation and other uses. The commission shall also develop and maintain programs and research on water quality problems. The commission may employ those personnel necessary to carry out its functions, including engineering, technical and professional specialists. (Silber-Florida)
W74-09163

WHO OWNS THE WATER,
J. McCall.
Environment, Vol 12, p 31-39, October 1970. 4 photo.

Descriptors: *Water pollution control, *Water quality control, *International commissions, *U.S. legislation(National and State), International joint commission, Water quality standards, Federal Water Pollution Control Act, Sewage disposal, Environmental sanitation, Sewage bacteria, Administrative agencies.

An analysis of water pollution in the world's rivers is divided into a consideration of international measures for water quality control, U.S. measures, and measures employed by other countries. Efforts to improve water quality in the rivers of Europe indicate a failure to place the realization of water pollution above political considerations. The United Nations and the World Health Organization in conjunction with the efforts of the nations themselves have done little more than declare water policy. This seems unsatisfactory in that policy remains useless without means of implementation and methods of enforcement. In general then, international activity seems insufficient to control pollution. On the national level in the United States, development of state agencies and water commissions are evidence of an effort to grant authority to establish water management programs with broad controls. Notwithstanding the effects of political necessity, chances for improvement appear greater in this approach than in international cooperation. Other nations of the world have developed patterns of attack similar to that of the United States. Problems throughout the world remain in the area of sewage treatment. Treatment processes must be refined in order to decrease water pollutants. (Proctor-Florida)
W74-09164

COUNTY SANITATION FACILITIES INSPECTION.
Tenn. Code Ann., secs. 5-1913 through 5-1916 (1969).

Descriptors: *Environmental sanitation, *Waste water disposal, *Environmental engineering, Tennessee, Sewage treatment, Local governments, Public health, Sewage disposal.

Procedures are defined for inspections of county sanitation and disposal facilities. The county sanitarian and commissioner of public health are permitted to inspect these facilities at their own initiative, however they must do so at least quarterly. The county sanitarian and the commissioner can give technical advice and assistance to local officials for the betterment of their refuse disposal practices. It is also realized that existing rights are not to be lessened by the addition of these statutes. However, a restriction is placed on an individual's

right to dispose of solid wastes on his own property, but only if such disposal will create a public nuisance or hazard to the public health. (Sutton-Florida)
W74-09165

INTERSTATE ENVIRONMENTAL COMPACT.
Tenn. Code Ann., sec. 53-5001 (1972).

Descriptors: *Legislation, *Tennessee, *Interagency cooperation, *Interstate compacts, Comprehensive planning, Interstate commissions, Governmental interrelations.

The state of Tennessee is authorized to enter with all other jurisdictions legally joining the interstate environmental compact. The compact was established to promote intergovernmental cooperation with environmental pollution problems that transcend state boundaries. The compact was also designed to avoid duplicate efforts by many individual agencies dealing with similar problems among the separate states. The state is authorized to execute supplementary agreements provided that the governor and legislature approve of the action to be taken. Nothing within this act shall be construed as invalidating any provision of law of any signatory, nor shall it modify or qualify the authority of any signatory to enact or enforce environmental protection legislation within its jurisdiction and not inconsistent with any provision of the compact. (Silber-Florida)
W74-09166

AUTHORITY TO LEASE SEA BOTTOM.
Miss. Code Ann., sec. 49-15-27 (1972).

Descriptors: *Mississippi, *Leases, *Legislation, *Water resources development, Sea water, Oceans, Administrative agencies, Riparian rights, Ports, Harbors, Channels, Recreation, Beaches, Shores, Marine life.

The Mississippi state commission created herein is authorized to lease sea bottoms within its jurisdiction providing the area is not now or hereafter designated as a tonging reef or natural reef or the area is not within the boundaries of riparian property owners. All individual lessees shall be residents of the state corporations organized under the laws of the state. No person may lease less than five acres nor more than one hundred acres, and any firm which holds or controls or attempts to hold or control by any device, more than two hundred acres of water bottom shall forfeit the leases so held by it. All leases shall be subject to the paramount right of the state and its subdivisions to promote and develop ports, harbors, channels, industrial or recreational projects. Such leases shall be awarded under such conditions as will insure the maximum culture and propagation of oysters. (Silber-Florida)
W74-09168

SOIL AND WATER CONSERVATION.
Pa. Stat. Ann., secs. 849-862, p 85-92 (1972).

Descriptors: *Pennsylvania, *Legislation, Erosion control, Agriculture, Dams, Reservoirs, Navigable waters, Harbors, Flood control, Drainage, Land use, Wildlife, Watersheds, Soil erosion.

The Soil and Water Conservation policy of the state of Pennsylvania is established as to all matters, concerns, and aspects of agriculture. The purposes of the law are to provide for the conservation of the soil, water and related resources of the state; control and prevent soil erosion, thereby preserving natural resources; assist in flood control; prevent impairment to dams and reservoirs; maintain the navigability of rivers and harbors; preserve wildlife; and protect public lands. The act creates the State Conservation Commission whose responsibility it is to offer assistance to conservation districts, to approve and coordinate joint programs among the several districts, to aid in land and water management and conservation of related natural resources and to approve projects and recommend priorities for planning for watershed management and development. The commission shall also have financial and contract powers as well as the authority to establish conservation districts when the public interest necessitates such action. (Silber-Florida)
W74-09169

MARINE RESOURCES COUNCIL.
Miss. Code Ann., secs. 57-15-5 through 57-15-7 (1972).

Descriptors: *Mississippi, *Legislation, *Administrative agencies, *Marine biology, *Water resources development, Coasts, Sea water, Aquatic life, Marine geology, Beds, Coastal plains, Shores, Beaches.
Identifiers: Marine Resources Council(Miss).

The Marine Resources Council is created to study, plan, report, make proposals and recommendations for the development and utilization of the coastal and offshore lands, waters and marine resources of the state, and to insure that all future plans and programs involving said marine resources will be coordinated with comparable agencies of the United States. The Council shall have as its aim to provide for effective, efficient and economic development of marine resources available to the state, and to cause suitable skilled professionals and labor to harness the marine resources of the state's coastal, offshore and water resources toward achieving the highest economic growth potential possible in the oceanographic field and scientific discovery of underwater marine resources. The Council shall cause to be carried out the continuing study of the science of oceanography and the development of a long-range oceanographic program for the State of Mississippi. (Silber-Florida)
W74-09170

PROPOSED LONG DRAW RESERVOIR ENLARGEMENT PROJECT, COLORADO, AN APPLICATION UNDER THE SMALL RECLAMATION PROJECTS ACT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 8A.
W74-09172

A QUIET REVOLUTION: FLORIDA'S FUTURE ON TRIAL,
Florida State Senate, Tallahassee.
For primary bibliographic entry see Field 4B.
W74-09173

6F. Nonstructural Alternatives

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, TAOS COUNTY,
New Mexico State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-09054

SUITABILITY OF NEW MEXICO LANDS FOR IRRIGATION,
New Mexico State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-09055

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, MCKINLEY COUNTY,
New Mexico State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-09056

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, VALENCIA COUNTY,
New Mexico State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-09057

A QUIET REVOLUTION: FLORIDA'S FUTURE ON TRIAL,
Florida State Senate, Tallahassee.
For primary bibliographic entry see Field 4B.
W74-09173

6G. Ecologic Impact Of Water Development

MAN-MADE LAKES: THEIR PROBLEMS AND ENVIRONMENTAL EFFECTS,
For primary bibliographic entry see Field 4A.
W74-08747

LAKE NASSER,
Lake Nasser Development Centre, Aswan, (Egypt).
For primary bibliographic entry see Field 4A.
W74-08749

ENVIRONMENT: A BIBLIOGRAPHY OF SOCIAL SCIENCE AND RELATED LITERATURE.
Michigan State Univ., Lansing.
For primary bibliographic entry see Field 10D.
W74-08824

ENVIRONMENTAL MANAGEMENT AND LOCAL GOVERNMENT,
International City Management Association, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-08827

ENVIRONMENTAL IMPACT ANALYSIS: A REVIEW OF THREE METHODOLOGIES,
Wisconsin Univ., Madison. Inst. for Environmental Studies.
M. L. Warner, and D. W. Bromley.
Available from the National Technical Information Service as PB-232 947 $3.75 in paper copy. $1.45 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report, 1974. 69 p, 5 figs, 6 tables, 125 refs. OWRR B-057-WIS (3), 14-31-0001-3354.

Descriptors: Resources, Economics, *Environmental effects, *Decision making, *Testing procedures, *Water quality control, *Water Quality standards, *Idaho, Methodology, Evaluation, Reviews.
Identifiers: *Environmental impact.

The National Environmental Policy Act of 1969 (NEPA) required the filing of environmental impact statements by Federal agencies proposing major actions significantly affecting the quality of the human environment. This research suggests bases for the evaluation and further development of methodologies used to prepare impact statements. Three methodologies are critically analyzed. They are: the 'Lepold approach,' suggested by Luna B. Leopold, et. al. (1971), the 'Battelle approach,' developed at Battelle's Columbus Laboratories for the U.S. Bureau of Reclamation (Dee, et. al, 1972), and the 'WRC approach,' contained in the 'Principles and Standards for Planning Water and Related Land Resources' of the U.S. Water Resources Council (1973). Specific criteria for methodology evalua-

tion are developed within the areas of: technical ecological content, practical applicability, and political utility. These criteria are designed to emphasize a 'full-disclosure law' interpretation of NEPA. The methodologies are examined using each set of criteria in turn. To provide a more concrete setting for this analysis, a test case involving a proposed U.S. Bureau of Reclamation water resources development project in Southwest Idaho was used. Data collection consisted of a point-by-point comparison of criteria and related desirable characteristics to each methodology. These data are analyzed for overall methodological conformance to the criteria to yield conclusions on the strengths and weakness of the methodologies.
W74-08839

ENVIRONMENTAL TECHNOLOGY AT NORWICH UNIVERSITY,
Norwich Univ., Northfield, Vt. Dept. of Engineering and Technology.
G. R. Pyper.
Journal of the New England Water Works Association, Vol 88, No 1, p 32-43, March, 1974. 3 ref.

Descriptors: *Education, *Environmental engineering, Universities, Training, Colleges, *Vermont.
Identifiers: Course of study, *Norwich University(Vermont).

The new and innovative 4 yr curriculum in Environmental Engineering Technology at Norwich University, Northfield Vermont, is described. The objective of the program is to produce an environmental technologist who has the technical competence to work with environmental engineers and support environmental activities with minimum supervision. The course of study includes the following environmental courses: Environmental Pollution, Air Resource Engineering, Hydrology and Water Resources, Water Analysis Instruments, Air Sampling and Monitoring, Water Pollution Control, Air Analysis Instruments, Air Field Lab Problems, and Water Field Lab Problems. The predominant characteristic of the technologist who will graduate from this program will be the technical ability to identify and define the extent of environmental pollution or establish that no pollution exists. (Merritt-FIRL)
W74-08871

A FOSSIL PLANT ENVIRONMENTAL IMPACT STUDY,
Nebraska Public Power District, Columbus.
For primary bibliographic entry see Field 5C.
W74-08874

SIGNIFICANCE OF ECOLOGICAL ANALYSES IN THE INTERPRETATION OF ENVIRONMENTAL RELEASES OF RADIONUCLIDES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5C.
W74-08878

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED HOPE CREEK GENERATING STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-08959

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF NINE MILE POINT NUCLEAR STATION UNIT 1.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 2H.
W74-08960

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF ST. LUCIE PLANT, UNIT 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-08961

NUCLEAR ENERGY AND THE ENVIRONMENT, AN INTERVIEW WITH A.G.C. COMMISSIONER DIXIE LEE RAY,
For primary bibliographic entry see Field 5G.
W74-09135

ONE DAMMED THING AFTER ANOTHER,
For primary bibliographic entry see Field 5G.
W74-09136

THE UPPER HUDSON WHITEWATER OR WASHWATER,
For primary bibliographic entry see Field 6D.
W74-09137

PROPOSED LONG DRAW RESERVOIR ENLARGEMENT PROJECT, COLORADO, AN APPLICATION UNDER THE SMALL RECLAMATION PROJECTS ACT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 8A.
W74-09172

7. RESOURCES DATA

7A. Network Design

DESIGN OF COST-EFFECTIVE WATER QUALITY SURVEILLANCE SYSTEMS,
Raytheon Co., Portsmouth, R.I. Oceanographic and Environmental Services.
For primary bibliographic entry see Field 5A.
W74-08825

DIMENSIONS OF MONITORING,
MITRE Corp., McLean, Va.
R. P. Ouellette, and J. W. Overbey, II.
In: Cycling and Control of Metals; Proceedings of Environmental Resources Conference, October 31-November 2, 1972, Columbus, Ohio: Environmental Protection Agency National Environmental Research Center, p 159-165, February 1973. 9 fig, 12 ref.

Descriptors: *Monitoring, *Water pollution, *Air pollution, Networks, Network design, Systems analysis.

Monitoring networks yield vast amounts of raw data which must be transformed into usable information by a filtering process which generally involves a complex transfer function. Monitoring systems exist in support of the decision making process for recommending actions. This process feeds on information not data. A systems approach can be used in designing these networks. (See also W74-09206) (Knapp-USGS)
W74-09217

7B. Data Acquition

AN INVESTIGATION OF THE COULTER COUNTER IN 'BIOMASS' DETERMINATIONS OF NATURAL FRESHWATER PHYTOPLANKTON POPULATIONS,
Royal Holloway Coll., Englefield Green (England).
For primary bibliographic entry see Field 5A.
W74-08727

A JEEP-MOUNTED RAINFALL SIMULATING INFILTROMETER,
Northern Arizona Univ., Flagstaff.
W. R. Henkle.
In: Hydrology and Water Resources in Arizona and the Southwest, Proc. of the 1973 meetings of the Arizona Section-AWRA and the Hydrology Section-Arizona Academy of Science, May 4-5, 1973, Tucson, Arizona, p 107-111, (1973). 2 fig, 4 ref.

Descriptors: *Infiltrometer, *Raindrops, *Rainfall intensity, *Rainfall simulators, *On-site tests, Infiltration, Runoff, Rainfall, Flow rates, Flow measurement, *Arizona, Mechanical equipment.

An infiltrometer was designed to more closely simulate natural storm characteristics and still maintain sufficient portability to be used in various test sites in the field. In addition to portability, a relatively large test plot can be used over a relatively long duration. The instrument is designed to produce rainfall intensities of 2 to 6 inches per hour which are comparable to natural storm intensities found in northern Arizona. Capillary tubes produce water drops of equivalent kinetic energy at impact to natural raindrops. Errors due to lateral flow are minimized through peripheral wetting. Mounting the infiltrometer on a four-wheel drive vehicle allows nearly the portability of a hand carried unit with a greater water carrying capacity and allows the equipment to be large enough to test a representative plot. (Mastic-Arizona)
W74-08766

INSTRUMENTATION AND ENVIRONMENTAL RADIATION ASSESSMENT SYSTEMS,
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-08876

AN AIRBORNE GAMMA RAY SPECTROMETER AND ITS APPLICATION IN NUCLEAR POWER PLANT SITE SURVEYS,
Rice Univ., Houston, Tex.
For primary bibliographic entry see Field 5A.
W74-08908

LIGHTING UP THE HAZE OF TURBIDITY MEASUREMENT.
Process Engineering, p 68-71, March, 1974. 4 fig, 1 tab.

Descriptors: *Turbidity, *Measurement, *Light, Light intensity, Optical properties, Instruments.
Identifiers: Turbidimeters, Nephelometers, Scattered light, Transmitted light.

The measurement of turbidity and turbidity measuring instruments which utilize optical methods and operate on several different principles are described. Some instruments operating on the reflected beam or scattering principles measure the scattering at 90 degrees and others measure low angle scattering up to 45 degrees. In some cases the ratio between the amount of transmitted light and of scattered light is measured. Measurement of the intensity of light transmitted through a liquid is known as turbidimetry and instruments operating on this principle are turbidimeters. Measurement of the intensity of scattered light is known as nephelometry and instruments using this principle are nephelometers, but instruments measuring the ratio of the transmitted and scattered light are also often known as turbidimeters. Diagrams of four different turbidimeters are presented and their operation is explained. (Merritt-FIRL)
W74-08912

TURBIDIMETERS MONITOR DUBAI FLOOD WATER.
The Oil and Gas Journal, Vol 72, No 15, p 68, April 15, 1974. 1 fig.

Descriptors: *Turbidity, *Measurement, Water quality, Treatment facilities, Waste water treatment, Equipment.
Identifiers: *Light scattering, *Turbidimeters, *Dubai, Arabian Gulf.

Turbidimeters utilizing a forward light scattering technique are monitoring water purity for waterflooding oil fields in the Arabian Gulf. The instruments use two modular subsystems, a transmitter and a converter. The transmitter is mounted in the process line and projects a beam of light through the process stream. The turbidimeters are insensitive to color and bubbles so produce accurate measurements of solids loading. Linear solid state detectors convert the varying intensity of the light scattered from the particulates into electrical signals. These signals are processed by the converter to produce an instantaneous computation and display of turbidity. (Merritt-FIRL)
W74-08913

FLUID SAMPLE ANALYSIS SYSTEM,
Durrum Development Corp., Palo Alto, Calif. (assignee)
E. L. Durrum, C. O. Forge, P. L. Y. Lee, and K. L. Mackinnon.
U.S. Patent 3,806,321. Official Gazette of the U.S. Patent Office, Vol 921, No 4, p 1577, April 23, 1974. 1 fig.

Descriptors: *Patents, *Liquids, *Analytical techniques, *Ion exchange, Separation techniques, Mixing, Pressure, Tubes.
Identifiers: Reagent, Eluent.

A fluid sample analysis system is described which is characterized by an ion exchange column which operates on a time basis. A reagent supply line under substantial positive pressure discharges reagent into the eluent of the ion exchange column for mixing reagent and eluent. There is a back pressure resistance to passage of fluid which is substantially matched to the back pressure resistance provided by the ion exchange column. The system is further characterized by means for mixing the eluent and reagent and by a tubular reaction coil. (Merritt-FIRL)
W74-08914

THE EFFECT OF EXCLUSION VOLUME ON POTENTIOMETRIC NITRATE MEASUREMENT,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W74-08919

TERRESTRIAL HEAT FLOW IN THE TERRITORY OF CZECHOSLAVAKIA AND THE MEASUREMENT OF THERMAL CONDUCTIVITY WITH FULLY-AUTOMATIC APPARATUS,
Ceskoslovenska Akademie Ved, Prague. Geofyzikalni Ustav.
For primary bibliographic entry see Field 4B.
W74-09004

ENDOCLAVE, A NEW DEVICE FOR THE STUDY OF HEAT AND MASS TRANSFER BY SIMULATION OF GEOLOGICAL BODIES AND PROCESSES UNDER DYNAMIC CONDITIONS,
Akademiya Nauk SSSR, Novosibirsk. Institut Geologii i Geofiziki.
For primary bibliographic entry see Field 2F.
W74-09007

HEAT TRANSFER MEASUREMENT IN THE WAKUDANI AND SOUNZAN GEOTHERMAL AREAS, HAKONE VOLCANO,
National Research Center for Disaster Prevention, Tokyo (Japan).
For primary bibliographic entry see Field 2F.
W74-09008

NEUTRON WELL LOGGING IN HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 4B.
W74-09053

A PORTABLE DEVICE FOR MEASURING WASTEWATER FLOW IN SEWERS,
Hittman Associates, Inc., Columbia, Md.
For primary bibliographic entry see Field 5D.
W74-09061

BORE HOLE SAMPLING OF SATURATED UNCEMENTED SANDS AND GRAVELS,
Commonwealth Scientific and Industrial Research Organization, Syndal (Australia). Div. of Applied Geomechanics.
For primary bibliographic entry see Field 4B.
W74-09094

THE POSSIBILITIES OF THE IDENTIFICATION OF PRECIPITATION ZONES WITH MISZ (METEOROLOGICAL ARTIFICIAL EARTH SATELLITES),
For primary bibliographic entry see Field 2B.
W74-09196

SEISMIC REFRACTION ANALYSIS OF WATERSHED MANTLE RELATED TO SOIL, GEOLOGY, AND HYDROLOGY,
Forest Service (USDA), Rapid City, S. Dak. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 2G.
W74-09199

CYCLING AND CONTROL OF METALS.
For primary bibliographic entry see Field 5B.
W74-09206

MONITORING FOR TRACE METALS--WATER ENVIRONMENT,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W74-09215

MONITORING OF SOLID WASTES,
Michigan Univ., Ann Arbor.
For primary bibliographic entry see Field 5A.
W74-09216

THE USE OF ION SPECIFIC ELECTRODES FOR CHEMICAL MONITORING OF MARINE SYSTEMS: PART I--THE AMMONIA ELECTRODE AS A SENSITIVE WATER QUALITY INDICATOR PROBE FOR RECIRCULATING MARICULTURE SYSTEMS,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 5A.
W74-09220

EVALUATION OF ERTS DATA FOR CERTAIN HYDROLOGICAL USES,
National Environmental Satellite Service, Hillcrest Heights, Md.
For primary bibliographic entry see Field 2C.
W74-09230

SURVEY OF LAKE FLOODING FROM ERTS-1: LAKE CHAMPLAIN.
Vermont Univ., Burlington. Dept. of Geography.
For primary bibliographic entry see Field 2H.
W74-09231

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING THE DRESDEN NUCLEAR POWER STATION, MORRIS, ILLINOIS, SEPTEMBER 1968,
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 5A.
W74-09250

7C. Evaluation, Processing and Publication

ESTIMATION AND MAPPING OF RATES OF EXCHANGE OF FRESH GROUNDWATER IN THE BALTIC ARTESIAN BASIN (OTSENKA I KARTIROVANIYE TEMPOV VODOOBMENA PRESNYKH PODZEMNYKH VOD (NA PRIMERE PRIBALTIYSKOGO ARTEZIANSKOGO BASSEYNA)),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 2F.
W74-08705

LAKE POWELL RESEARCH PROJECT: HYDROLOGIC RESEARCH,
California Univ., Los Angeles. Inst. of Geophysics.
For primary bibliographic entry see Field 2H.
W74-08767

THE EFFECT OF DATA DENSITY ON GROUNDWATER CONTOURING ACCURACY,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
For primary bibliographic entry see Field 2F.
W74-08781

DESIGN OF COST-EFFECTIVE WATER QUALITY SURVEILLANCE SYSTEMS,
Raytheon Co., Portsmouth, R.I. Oceanographic and Environmental Services.
For primary bibliographic entry see Field 5A.
W74-08825

PREDICTION OF DEW POINT TEMPERATURE, SOLAR RADIATION AND WIND MOVEMENT DATA FOR SIMULATION AND OPERATIONS RESEARCH MODELS,
Hydrocomp, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 2B.
W74-08933

PHOTOGRAMMETRIC TECHNIQUES APPLIED IN THE DEVELOPMENT OF GEOTHERMAL RESOURCES IN MATSUKAWA AND OTAKE GEOTHERMAL AREAS USING A VECTOR METHOD,
International Geodetic Survey Inst. Co. Ltd., Tokyo (Japan).
For primary bibliographic entry see Field 4B.
W74-09012

STATICAL INTERPRETATION OF CHEMICAL RESULTS FROM DRILLHOLES AS AN AID TO GEOTHERMAL PROSPECTING AND EXPLOITATION,
Department of Scientific and Industrial Research, Wellington (New Zealand).
For primary bibliographic entry see Field 4B.
W74-09014

DIGITAL-COMPUTER PROGRAMS FOR ANALYSIS OF GROUND-WATER FLOW,
Geological Survey, Little Rock, Ark.
For primary bibliographic entry see Field 2F.
W74-09115

WATER RESOURCES DATA FOR GEORGIA, 1973.
Geological Survey, Doraville, Ga.
Data Report, 1974. 231 p, 4 fig, 4 tab, 7 ref.

Descriptors: *Hydrologic data, *Surface waters, *Georgia, Water quality, Streamflow, Gaging stations, *Data collections, Discharge(Water), Sampling, Solutes, Water temperature.

Water resources data for the 1973 water year for Georgia include records of streamflow or reservoir storage at gaging stations, partial-record stations, miscellaneous sites, and records of water-quality data on the chemical and physical characteristics of surface water as well as records for a few pertinent gaging and water-quality stations in bordering States. The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. (Knapp-USGS)
W74-09116

APPLICATION OF THE GREEN AND COREY METHOD FOR COMPUTING HYDRAULIC CONDUCTIVITY IN HYDROLOGIC MODELING,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 2G.
W74-09195

SURFACE WATER TEMPERATURES AT SHORE STATIONS, UNITED STATES WEST COAST, 1972.
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 2E.
W74-09197

SMALL-STREAM FLOOD INVESTIGATIONS IN ALASKA, A COMPILATION OF PEAK DATA, MAY 1963 TO SEPTEMBER 1972,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 2E.
W74-09218

EFFECT OF MINE DRAINAGE ON THE QUALITY OF STREAMS IN COLORADO, 1971-72,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 5B.
W74-09228

ANNUAL REPORT ON GROUND WATER IN ARIZONA, SPRING 1972 TO SPRING 1973.
Geological Survey, Phoenix, Ariz.
For primary bibliographic entry see Field 4B.
W74-09229

EVALUATION OF ERTS DATA FOR CERTAIN HYDROLOGICAL USES,
National Environmental Satellite Service, Hillcrest Heights, Md.
For primary bibliographic entry see Field 2C.
W74-09230

8. ENGINEERING WORKS

8A. Structures

TECHNICAL DEVELOPMENTS.
For primary bibliographic entry see Field 8G.
W74-08820

DEVICE FOR CONDUCTING WASTE LIQUID FROM A RECEPTACLE TO A PNEUMATIC LIQUID DISPOSAL SYSTEM,
Aktiebolaget Electrolux, Stockholm (Sweden). (assignee)
S. E. A. Svanteson.
U.S. Patent 3,807,431. Official Gazette of the U.S. Patent Office, Vol 921, No 5, p 1874, April 30, 1974. 1 fig.

Descriptors: *Patents, *Equipment, *Liquid waste, Sewage, *Waste disposal, *Air.
Identifiers: *Liquid waste transport.

An apparatus for conveying waste liquid from a hold receptacle to a vacuum sewage disposal system is described. The waste liquid is conducted through a transport conduit into which atmospheric air is able to enter. The air-waste liquid provides a more efficient moving of the waste. (Merritt-FIRL)
W74-08901

REVIEW OF PRECAST PRESTRESSED CONCRETE WATER STORAGE RESERVOIRS,
Natgun Corp., Wakefield, Mass.
For primary bibliographic entry see Field 8F.
W74-08906

GEOTHERMAL DRILLING AND PRELIMINARY TEST OPERATIONS AT KIZILDERE, TURKEY,
Mineral Research and Exploration Inst., Ankara (Turkey). Technical data.
E. Durucan, and K. Olcenoglu.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1463-1466, 1973. 4 fig.

Descriptors: *Drilling, *Well casings, *Geothermal studies, Wells, Water temperature, Steam, Hydrothermal studies, Rotary drilling, Drilling equipment, Well screens.
Identifiers: *Geothermal power, *Turkey(Kizildere).

The drilling equipment utilized for steam boreholes in Turkey is described with reference to drilling mud used and cementing operations. The first geothermal well drilling for natural steam at Kizildere was started in 1968. From the first test well a mixture of steam and hot water was produced. Up to now, seven deep test wells have been completed. Six of them are in the first reservoir and the seventh one is in the second reservoir. Gradient wells are about 100 m in depth. These have been drilled to measure the value of geothermal gradients in the different places of the field. The deep test wells go down to the reservoir. They have been drilled for testing and also for production purposes. (See also W74-08973) (Knapp-USGS)
W74-09029

PRESENT STATE OF DRILLING AND REPAIRING OF GEOTHERMAL PRODUCTION WELLS IN JAPAN,
Teiseki Sakusei Kogyo Co. Ltd. (Japan).
K. Matsuo.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1467-1479, 1973. 9 fig, 1 tab.

Descriptors: *Drilling, *Well casings, *Geothermal studies, Wells, Water temperature, Steam, Hydrothermal studies, Rotary drilling, Drilling equipment, Well screens.
Identifiers: *Geothermal power, *Japan.

Japan is a prominently volcanic country with many hot springs and abundant geothermal resources. As a result of exploration during the past ten years, many geothermal wells were drilled, and geothermal electric power stations have been constructed in two areas of Matsukawa in the Iwate Prefecture and at Otake in Kyushu. The drilling of geothermal production wells is basically the same as that of petroleum and natural gas. The rigs and equipment used for the drilling operation are exactly the same as those used for petroleum and natural gas. However, in the actual drilling operation, there are some problems which are inherent in the drilling of geothermal wells. (See also W74-08973) (Knapp-USGS)
W74-09030

GEOTHERMAL DRILLING IN THE MATSUKAWA AREA,
Japan Metals and Chemicals Co. Ltd., Morioka.
Y. Nakajima.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1480-1484, 1973. 4 tab.

Descriptors: *Drilling, *Well casings, *Geothermal studies, Wells, Water temperature, Stream, Hydrothermal studies, Rotary drilling, Drilling equipment, Well screens.
Identifiers: *Geothermal power, *Japan(Matsukawa).

In the Matsukawa geothermal area of Japan 6 wildcat holes and 6 production holes of 325-1500 meters depth have been drilled. Most of the hot water and the steam of that area exist in the fractured zone lying near the boundary between the Yamatsuri formation and the Tamagawa welded tuff at about 1,000 meters. Therefore, further drilling is being carried out aiming at that zone. The wells are comparatively deep, rocks are hard, temperature is high, and mud escape occurs frequently. Different drilling rigs were used according to the depth of 500, 1,000 and 1,500 meters. Chromite mud comparatively stable at high temperature was used as the circulated fluid. Pure water was used in case of mud escape. (See also W74-08973) (Knapp-USGS)
W74-09031

CASING STRING DESIGN FOR GEOTHERMAL WELLS,
Ministry of Works, Wellington (New Zealand).
N. D. Dench.
In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1485-1496, 1973. 7 fig, 7 tab, 10 ref.

Descriptors: *Drilling, *Well casings, *Geothermal studies, Wells, Water temperature, Stream, Hydrothermal studies, Rotary drilling, Drilling equipment, Well screens.
Identifiers: *Geothermal power, New Zealand.

Drilling to depths exceeding 1600 feet was carried out in ten geothermal fields in the North Island of New Zealand. Measurements in the wells established the pattern of temperatures and pressures which occur throughout their depth and life and which are used in calculating the various loads imposed on the casings. Changes of temperature caused by drilling operations result in severe casing stresses, and sometimes in failure, particularly in axial compression. The ability of several types of casing joints to resist this loading was measured in laboratory tests, and enough results have been obtained to allow the designer to estimate accurately failure strengths for some joints, and to make the best choice for any particular service. By relating design loads to casing strengths for various conditions of stressing, a set of design factors has proved useful in assessing the adequacy of casing strings proposed for geothermal service. Downhole conditions and joint testing together with examples of casing designs are given. (See also W74-08973) (Knapp-USGS)
W74-09032

EFFECT OF SLOTTED LINEAR CASING ON GEOTHERMAL BORES,
Japan Metals and Chemicals Co. Ltd., Morioka. Geothermal Power Div.
K. Katagiri.

In: Proceedings of the United Nations Symposium on the Development and Utilization of Geothermal Resources, Pisa, Italy, Sept 22-Oct 1, 1970: Geothermics 1970, Special Issue 2, Vol 2, Part 2, p 1497-1501, 1973. 3 fig, 1 tab.

Descriptors: *Drilling, *Well casings, *Geothermal studies, Wells, Water temperature, Steam, Hydrothermal studies, Rotary drilling, Drilling equipment, Well screens.
Identifiers: *Geothermal power, Japan.

Since 1964, six steam wells for geothermal power have been drilled in the geothermal area in Matsukawa, Japan. In drilling these steam wells, slotted liners with 6 5/8 inch diameter or 7 inch diameter have been unconditionally adopted. In drilling the sixth well, however, further study of the geological sequence of the hydrothermal reservoir suggested that the geological sequence in Matsukawa geothermal area was strong enough for an open hole. Only two months after completion, blocking occurred inside the hydrothermal reservoir. The blocked part was repaired immediately, but the failure showed the necessity of the slotted liner casing. Discharge is now about 60 tons per hour. (See also W74-08973) (Knapp-USGS)
W74-09033

FACTORS CONTROLLING BOREHOLE PERFORMANCE,
Department of Scientific and Industrial Research, Taupo (New Zealand).
For primary bibliographic entry see Field 2F.
W74-09034

PROPOSED JETTY-HEAD REPAIR SECTIONS, HUMBOLDT BAY, CALIFORNIA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
D. D. Davidson.
Available from NTIS, Springfield, Va. 22151, AD-756 212, Price $3.00 printed copy; $1.45 microfiche. Technical Report H-71-8, November 1971. 144 p, 31 plate, 60 photo, 12 ref.

Descriptors: *Coastal engineering, *Jetties, *California, Shore protection, Bays, Harbors.
Identifiers: *Humboldt Bay(Calif).

Tests were conducted on a 1:50-scale model of the north jetty at Humboldt Bay, Calif., to determine how economical and stable repair sections can be designed to stop deterioration caused by wave action. Design of a satisfactory repair section is made difficult because of the large waves and day-to-day sea conditions that prohibit the use of floating plant for construction, the limited lifting capacity and horizontal reach of available land-based construction equipment, and the necessity of placing the armor unit toe protection on the existing underwater rubble mound. The study included the investigation of (a) the waves that can attack the proposed structure, (b) the effects of stability of linking the armor units, and (c) the optimum shape of armor unit and repair section that would be stable for the selected design-wave conditions. (Knapp-USGS)
W74-09117

PROPOSED LONG DRAW RESERVOIR ENLARGEMENT PROJECT, COLORADO, AN APPLICATION UNDER THE SMALL RECLAMATION PROJECTS ACT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Denver, Colo.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va., as EIS-CO-73-0183-F. February 7, 1973. 147 p, 4 tab, 15 map, 2 chart.

Descriptors: Effects, *Reservoirs, *Legislation, *Dams, Damsites, Backwater, Water storage, Irrigation, Flood control.
Identifiers: *Environmental Impact Statements, *Long Draw Reservoir(Colo).

This project entails enlargement of the Long Draw Dam and Reservoir on La Poudre Pass Creek, located near Fort Collins, Colorado. The project includes construction of reservoir recreation facilities, lining short sections of the existing Grand River Ditch to reduce water seepage, and rehabilitation of associated existing ditch structures within Rocky Mountain National Park. The project will provide supplemental water to Front Range irrigators and reservoir related recreation opportunities. The water will irrigate 37,425 acres of cropland, increase crop yields, and stabilize farmer income and the local economy. Other benefits of the project include strengthening the existing dam, accomodating 33,000 visitor days of annual recreation, a permanent pool for maintaining a trout fishery, and reducing downhill erosion adjacent to the Grand River Ditch. About one hundred and six acres of wildlife habitat and one-half mile of a stream fishery will be inundated. Alternative considerations included not construction the project, winterizing the Grand River Ditch, modifying existing water systems and alternative dam and reservoir sites. (Conko-Florida)
W74-09172

MODEL STUDY OF TROTTERS SHOALS SPILLWAY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-09204

HULAH DAM EMERGENCY BULKHEAD PROTOTYPE CLOSURE TESTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8C.
W74-09205

8B. Hydraulics

NUMERICAL COMPUTATION OF MOMENTUM JETS AND FORCED PLUMES,
Battelle-Pacific Northwest Labs., Richland, Wash.
D. S. Trent, and J. R. Welty.
Computer and Fluids, Vol 1, No 4, p 331-357, December, 1973. 24 fig, 1 tab, 17 ref.

Descriptors: *Mathematical studies, Equations, *Model studies, Turbulent flow, *Jets.
Identifiers: *Plumes.

A numerical study of vertical momentum jets and forced plumes issuing to similar receiving media is presented. The complete partial differential equations governing steady, incompressible, turbulent flow are solved in axisymmetric coordinates using finite difference techniques. Solutions were based on the stream function vorticity transport approach for a Boussineq fluid. Buoyant driving forces were coupled to the vorticity equation which included effects of temperature and other constituents. Turbulent transport coefficients were computed iteratively using the Prandtl eddy diffusivity model. Results for the momentum jet, axial, and radial distributions of velocity and concentration show excellent agreement with published data. Forced plume computations are presented which include similar results for densimetric Froude numbers ranging from 1 to 1000. (Merritt-FIRL)
W74-08782

SIMULATION OF DISSOLVED OXYGEN PROFILE,
Worcester Polytechnic Inst., Mass. Dept. of Mathematics.
For primary bibliographic entry see Field 5B.
W74-08823

A PORTABLE DEVICE FOR MEASURING WASTEWATER FLOW IN SEWERS,
Hittman Associates, Inc., Columbia, Md.
For primary bibliographic entry see Field 5D.
W74-09061

AN INVESTIGATION OF SECONDARY FLOW EFFECTS IN CURVED CHANNELS OF SQUARE CROSS SECTION,
Naval Postgraduate School, Monterey, Calif.
P. S. Kenney.
Available from NTIS, Springfield, Va. 22151 as AD-764 502 Price $5.50 printed copy; $1.45 microfiche. M Sc Thesis, June 1973. 63 p, 30 fig, 1 tab, 3 ref.

Descriptors: *Open channel flow, *Vortices, Meanders, Turbulent flow, Hydraulic models, Channel morphology.
Identifiers: *Secondary flow.

Turbulent flow in a curved channel of square cross section was investigated experimentally to determine secondary flow effects. Probe surveys were conducted to establish vortex and total pressure loss distribution in the exit plane of a 90 deg bend. Overall losses were determined by measuring the momentum of the flow with a force plate for different Reynolds numbers at turning angles of 0, 45, 90, and 135 deg. There is a definite increase in the average total loss coefficient with turning angle. (Knapp-USGS)
W74-09193

MODEL STUDY OF TROTTERS SHOALS SPILLWAY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
B. P. Fletcher, and J. L. Grace, Jr.
Available from NTIS, Springfield, Va 22151 as AD-762 539 price $3.00 printed copy; $1.45 microfiche. Technical Report H-73-7, June 1973. 19 p, 9 fig, 24 plate, 12 photo, 1 tab.

Descriptors: *Hydraulic models, *Spillways, *Open channel flow, Hydraulic jump, Spillway crests, Model studies, Energy dissipation, *Georgia, *South Carolina.
Identifiers: *Trotters Shoals Dam(Ga-SC).

The spillway for the Trotters Shoals Dam (Georgia and South Carolina) was tested on a 1:80-scale model to investigate flow conditions in the approach and exit channel and the performance of various elements of the structure. Particular emphasis was placed on the development of an energy dissipator that would provide satisfactory energy dissipation and exit channel flow conditions. Approach flow conditions were improved by revising the left abutment to prevent a severe drawdown of the water surface. After the left abutment was modified, the spillway capacity was equal to that computed. Nappe separation from the downstream quadrant of the crest was prevented by extending the crest piers upstream and shifting the gate slots downstream relative to their original positions. These modifications improved pressure conditions within the gate slots as well as along the spillway crest. The type 3 stilling basin provided more appropriate energy dissipation than flip buckets and it reduced the maximum velocities and the concentration of flow along the left side of the exit channel. The instantaneous forces induced by the hydraulic jump on the monoliths composing the left stilling basin wall were also determined. (Knapp-USGS)
W74-09204

SOME NEW METHODS OF TOPOLOGIC CLASSIFICATION OF CHANNEL NETWORKS,
IBM Thomas J. Watson Research Center, Yorktown Heights, N.Y.
C. Werner, and J. S. Smart.
Available from NTIS, Springfield, Va. 22151 as AD-759 385 - Price $3.00 printed copy; $1.45

microfiche. Technical Report No 9, January 24, 1973. 46 p, 11 fig, 4 tab, 25 ref. ONR Contract N00014-70-C-0188.

Descriptors: *Geomorphology, *Drainage patterns(Geologic), Drainage density, Streams, Channel morphology.
Identifiers: *Topology.

Some new methods for the topologic classification of channel networks are proposed. These methods are all based on the concept of topologic path length, or number of links from the network outlet to a junction or source. Two parameters, the total path length (sum of all path lengths) and the diameter (largest path length), are useful in network analysis. Some advantages of these parameters are that they are easy to measure, have straightforward topologic interpretations, and are closely related to important geometric measures. Moreover, they are capable of explaining various empirical geomorphic laws, such as the 0.6 power relation between mainstream length and area. (Knapp-USGS)
W74-09221

8C. Hydraulic Machinery

AMERICAN RIVER PLANT ADDS AUTOMATED PUMPING STATION.
Instrumentation, Vol 27, No 1, p 6-9, 1974. 6 fig.

Descriptors: *Reservoirs, *Pumping plants, *Automatic control, Remote control, Water supply development, *California.
Identifiers: *Sacramento(Calif), *Florin Reservoir(Calif).

The Florin Reservoir and Pumping Station of the American River Water Treatment Plant is described. It is a remote-control, unmanned facility built completely underground in Sacramento, Calif. The Florin station is equipped with instrumentation which automatically starts, stops, or throttles the appropriate combination of three horizontal centrifugal split case pumps. Completion of the Florin Station represents a significant step in Sacramento's master plan of water system development and expansion to the year 2030 when the plant will handle 330 mgd. (Merritt-FIRL)
W74-08780

TUNNEL FAILURE DELAYS SEWER SYSTEM STARTUP.
Engineering News-Record, Vol 192, No 2, p12, January 10, 1974.

Descriptors: *Pumping plants, *Sewage, Tunnels, *Sewers, Concrete pipes, *Failures.

Operation of a 170 mgd sewage pumping station in lower Manhattan, under construction since 1967, will be delayed until 1975 because of the failure of two sections of interceptor sewer tunnel that have been completed since 1961, waiting to feed the station. The failure of the 300 ft of 9 ft diameter concrete lined interceptor appears related to the construction of the pumping station. The tunnel sections that failed were driven in soft ground under compressed air about 40 ft below the street. Their primary lining is cast iron segmental rings with steel rib support. (Merritt-FIRL)
W74-08790

DEVELOPMENT OF AUTOMATED SURFACE IRRIGATION,
Department of Agriculture, Lethbridge (Alberta). Research Station.
For primary bibliographic entry see Field 3F.
W74-08804

DEVELOPMENT AND FUTURE OF DREDGING,
Corps of Engineers, Atlanta, Ga. South Atlantic Div.
For primary bibliographic entry see Field 5G.
W74-08893

FRAME FOR A SEMI-PERMEABLE MEMBRANE ASSEMBLY,
Rhone-Poulene S.A., Paris (France). (Assignee)
Y. Butruille, and J. Mourlan.
U.S. Patent 3,805,960. Official Gazette of the U.S. Patent Office, Vol 921, No 4, p 1483, April 23, 1974. 1 fig.

Descriptors: *Semipermeable membranes, *Patents, Equipment, *Membranes.
Identifiers: *Frames.

Frames for clamping together the plane membrane and interposed plates of a semi-permeable membrane stack are described. The frame comprises two frame plates interconnected by tie bars extending from one of the plates to pass through orifices in the other plate. The orifices are countersunk in such a way that the tiebars may be deformed in the orifices to limit subsequent increases in the distance between the two frame plates, so that the semi-permeable membrane stack is held tightly together. (Merritt-FIRL)
W74-08898

AUTOMATIC VALVES, PARTICULARLY FOR USE WITH FILTERS,
Engineering Components Ltd., Liverpool (England). (Assignee)
J. C. Cullis.
U.S. Patent 3,807,561. Official Gazette of the U.S. Patent Office, Vol 921, No 5, p 1909, April 30, 1974. 1 fig.

Descriptors: *Patents, *Valves, *Filters, Equipment, Filtration, Waste water treatment.

An automatic valve of the poppet or mushroom type is described for use with a filter. It is molded as an integral unit from glass fiber reinforced nylon and has a head and a stem consisting of two parallel limbs formed at their free ends with lateral hook-like projections. The limbs can be pressed together to enable the projections to pass through a port in a ported member. They then can be allowed to spring back to their normal configuration, engaging a spring interposed between the projections and ported member. (Merritt-FIRL)
W74-08900

FEASIBILITY STUDY OF HYDROCYCLONE SYSTEMS FOR DREDGE OPERATIONS,
Oklahoma State Univ., Stillwater. Office of Engineering Research.
For primary bibliographic entry see Field 5D.
W74-09202

HULAH DAM EMERGENCY BULKHEAD PROTOTYPE CLOSURE TESTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
W. C. Blanton, J. E. Hall, and D. F. Bastian.
Available from NTIS, Springfield, Va 22151 as AD-767 235; Price $3.50 printed copy; $1.45 microfiche. Miscellaneous Paper H-73-8, September 1973. 17 p, 11 plate, 1 tab.

Descriptors: *Gates, *Spillways, *Bulkhead gates, Flow control, Gate seals, *Oklahoma, Hydraulic structures, Dams.
Identifiers: Hulah Dam(Okla).

The emergency bulkhead gate at Hulah Dam, Oklahoma, was tested to determine its effectiveness in stopping flow at various control gate positions. The bulkhead consistently stopped at a position approximately 2 ft above the seat for every opening of the control gate. Measurements of downpull and acceleration revealed that an average peak hoist force of 22,500 lb occurred with the control gate full open and a bulkhead position of 5.8 to 7.0 ft above the seat. A maximum acceleration of 0.5 g was recorded with the control gate full open and the bulkhead 6 ft above the seat. Emergency closure of the gate under the conditions tested is not possible. (Knapp-USGS)
W74-09205

8D. Soil Mechanics

FALL AND RISE OF LAGO DEL ORO,
Dept. of Civil Engineering, Knoxville, Tennessee Univ.,
For primary bibliographic entry see Field 4A.
W74-08751

8F. Concrete

REVIEW OF PRECAST PRESTRESSED CONCRETE WATER STORAGE RESERVOIRS,
Natgun Corp., Wakefield, Mass.
K. O. Hodgson.
Journal of the New England Water Works Association, Vol 88, No 1, p 58-63, March, 1974.

Descriptors: *Storage tanks, *Water storage, *Reservoir storage, *Concrete structures, Prestressing, Reviews.
Identifiers: *Precasting.

Precast prestressed concrete water storage reservoirs are discussed. The tanks have a low profile, versatility of installation, require no painting inside or outside, and have low or minimum maintenance requirements. The domed tanks which are more common than flat tops do not have and do not need columns. They do not have to be taken out of service. There are three types of tanks: small tanks in sizes 100,000 to 500,000 gallons of the precast reinforced concrete panel type, with diaphragm, but not wire wound or prestressed; the regular precast prestressed concrete tanks in sizes 500,000 gallons and up, and the concrete domes for existing circular tanks or for circular reservoirs. Exterior architectural treatment is possible for all tanks. (Merritt-FIRL)
W74-08906

8G. Materials

UNIVERSITY CREDITS FEEDWATER TREATMENT PROGRAM FOR 50% CUT IN BOILER CLEANING WORK LOAD.
National Engineer, Vol 78, No 2, p 12-13, February, 1974. 5 fig.

Descriptors: *Boilers, *Cleaning, *Corrosion control, Costs, Scaling, Alkalinity, Phosphates, Sludge, Control, *New York, Water treatment.
Identifiers: *Buffalo(N.Y.).

The treatment program for boiler feedwater and condensate return lines at State University of New York at Buffalo is described. It is proving effective by keeping three boilers and more than two miles of return lines free of scale and corrosion. The program consists of alkalinity adjustment, phosphate softening, sludge control, iron sequestration, foam control, and return line corrosion control. It is estimated there is a 50 percent cut in boiler cleaning work load. (Merritt-FIRL)
W74-08797

TECHNICAL DEVELOPMENTS.
Pipes and Pipelines International, Vol 18, No 1, p 39, November, 1973.

Descriptors: *Pipes, *Pipelines, *Welding, Welded joints, Plastics, Drainage system.

Identifiers: Magnetic crack detectors, *United Kingdom.

Technical developments in the pipe and pipeline industry are summarized. An orbital welding machine consisting of an argon arc welding head carrying a tungsten electrode which rotates about the pipe joint was developed by Startrite Designs, Ltd., Gillingham, England. The machine practically eliminates underbead in the pipe bore, so that flow patterns can be considerably improved. An ICI traveling exhibition toured Great Britain to show how pipes made from Propathene, ICI's polypropylene, have solved many industrial pipework problems for drainage and disposal systems. A combined infill/carrier pipe for road and underground drainage was developed from the Turnall asbestos cement pipe of TAC Construction Materials, Ltd., Manchester. A new range of horizontal magnetic particle crack detectors was designed by Vitosonics, Ltd., Current is passed through the test piece to detect longitudinal defects, and magnetic flux generated by a circumferential coil is used for transverse defect indication. (Merritt-FIRL)
W74-08820

CORROSION-RESISTANT PIPE AT WALT DISNEY WORLD.
Water and Sewage Works, Vol 121, No 4, p 52-53, April, 1974.

Descriptors: *Sewers, *Water cooling, *Water distribution(Applied), *Florida, Pipes, *Corrosion control, Pipes, Wells, Water supply.

The chilled water and sewer distribution system buried beneath the ground at Walt Disney World near Orlando, Florida is discussed. The area's high water table and stringent demands for performance resulted in the use of new and unusual corrosion resistant pipe materials. A drainage system keeps the ground stabilized, but pipe inside the trench is often submerged in water. The 24 in diameter Temp-Tite pipe consists of an outer jacket of corrosion resistant asbestos cement pipe, a closed cell polyurethane foam insulation, and an inner core pipe of epoxy lined a-c pipe that carries the water. It is a factory fabricated preinsulated design that does not require expansion joints. The pipe system is connected by ring type joints providing a tight seal and allowing for pipe expansion and contraction. Thrust blocks are required. The pipe is not affected by corrosive soil and does not require cathodic protection. Water supply is plentiful in the Orlando area, and seven wells were built to handle all water needs. (Merritt-FIRL)
W74-08892

BORE HOLE SAMPLING OF SATURATED UNCEMENTED SANDS AND GRAVELS,
Commonwealth Scientific and Industrial Research Organization, Syndal (Australia). Div. of Applied Geomechanics.
For primary bibliographic entry see Field 4B.
W74-09094

8I. Fisheries Engineering

EARLY LIFE HISTORY AND FEEDING OF YOUNG MOUNTAIN WHITEFISH,
Utah State Univ., Logan. Dept. of Wildlife Science.
For primary bibliographic entry see Field 5C.
W74-08832

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

ENVIRONMENTAL TECHNOLOGY AT NORWICH UNIVERSITY,
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For primary bibliographic entry see Field 6G.
W74-08871

HYDROGEOLOGY IS MORE THAN A CLASSICAL SCIENCE,
Wisconsin Univ., Madison. Water Resources Management Program.
For primary bibliographic entry see Field 2A.
W74-09090

9B. Education (In-House)

WATER UTILITIES OPERATOR TRAINING: A WORTHY INVESTMENT,
Texas Water Quality Board, Austin. Central Operations Div.
For primary bibliographic entry see Field 5D.
W74-08879

9D. Grants, Contracts, and Research Act Allotments

GREAT LAKES RESEARCH PROJECT FORECASTS DIRECTORY 1973,
National Ocean Survey, Detroit, Mich. Lake Survey Center.
For primary bibliographic entry see Field 2H.
W74-09118

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

ENVIRONMENTAL ASPECTS OF PLUTONIUM -- A SELECTED, ANNOTATED BIBLIOGRAPHY.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-08957

ENVIRONMENTAL ASPECTS OF PLUTONIUM AND OTHER ELEMENTS - A SELECTED ANNOTATED BIBLIOGRAPHY.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-08958

AN ANNOTATED BIBLIOGRAPHY FOR ECONOMIC EVALUATIONS OF THE AQUACULTURE OF SELECTED CRUSTACEANS AND MOLLUSKS,
California Univ., Davis. Dept. of Agricultural Economics.
W. E. Johnston, and D. W. Collinsworth.
Available from the National Technical Information Service as COM-73-11568. California Univ., Institute of Marine Resources, La Jolla, Reference No. 74-3, Sea Grant Publication No. 2, August 1973.

Descriptors: *Bibliographies, *Aquiculture, *Economics, *Shellfish, Mollusks, Oysters, Crustaceans, Shrimp, Crabs, Lobsters, Commercial shellfish.

A selective annotated bibliography of economic data sources and previous economic analyses related to the aquaculture of selected crustaceans and mollusks is presented. While primarily concerned with data related to the Northern lobster, selected references are included for the spiny lobster as well as certain species of oysters, shrimp, and prawns. The bibliography's 111 listings are divided by bibliographies on general aquaculture and specific species, abstracts/indexes, statistical sources, aquaculture, natural fisheries, fisheries with potential for aquaculture, product marketing studies and an author index. (Schroeder-Wisconsin)
W74-09067

GREAT LAKES RESEARCH PROJECT FORECASTS DIRECTORY 1973,
National Ocean Survey, Detroit, Mich. Lake Survey Center.
For primary bibliographic entry see Field 2H.
W74-09118

10D. Specialized Information Center Services

ENVIRONMENT: A BIBLIOGRAPHY OF SOCIAL SCIENCE AND RELATED LITERATURE.
Michigan State Univ., Lansing.
Environmental Protection Agency, Socioeconomic Studies Series Report EPA-600/5-74-011, February 1974, 860 p. Compiled by D. E. Morrison, K. E. Hornback, W. K. Warner. EPA R-801234.

Descriptors: *Bibliographies, *Social aspects, Information retrieval. Social impact, Attitudes, Community development, Political aspects, Psychological aspects, Landscaping, *Environment.

This comprehensive, unannotated bibliography contains nearly 5,000 items covering literature in and related to the Fields of anthropology, communications, economics, education, design, geography, history, human ecology, landscape architecture, management, planning, politics and social psychology and sociology. The emphasis is on literature that is substantively, methodologically or theoretically relevant to man and his activities in relationship to natural environments. The bibliography is listed alphabetically by author, with an extensive, crosslisted subject-by-title index under 42 categories: Aesthetic, Humanistic, Literary, Religious, Philosophic; Agriculture, Food, Ranching, Rural; Air; Anthropology; Attitudes, Behavior, Opinions, Motives Values, Perceptions, Cognitions, Knowledge, Psychology, Social Psychology; Built Environment-Natural Environment Interface, Including Urban Environment-Natural Environment Relationships; Climate; Communications, Media; Conflicts, Controversy, Competion, Issues; Conservation, Conservation Movement; Economics, Business, Industry, Economic Growth and Development, Work, Occupations; Education; Energy, Minerals; Forests; General Ecology, General Environment, Social Ecology, Human Ecology, Eco-Systems; Geography, Regional Studies; Government, Public Agencies; History; International, Interstate, Intergovernmental, Interagency; Land; Law, Property Rights; Management, Policy, Decision Making, Planning, Development; Medicine, Health; Methodology, Evaluation, Measurement, Indicators, Systems Analysis, Cost-Benefit Techniques, Projections, Monitoring, Control, Standards, Performance Criteria, Theory, Concepts; Natural Disasters, Natural Hazards; Natural Resources, General; Noise; Place Names in Title; Politics; Pollution; Population, Demography, Migration, Crowding; Quality of Life, Affluence, Living Standards, General Environmental Quality; Readers, Conference Proceedings, Special Issues, Textbooks; Recreation, Leisure, Parks, Wilderness, Wildlife, Nature; Reference: Bibliogra-

phies, Data Sets, Catalogs, Directories, Literature Surveys and Reviews; Science, Technology; Sociology, Social Organization, Institutions, Culture, Society; Space, Spatial Behavior, Territoriality; Transportation; Voluntary Action, Voluntary Organizations, Citizen Participation, Social Movements; Waste; and Water.
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- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

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2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 18
SEPTEMBER 15, 1974

W74-09251 -- W74-09800

SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

VOLUME 7, NUMBER 18
SEPTEMBER 15, 1974

W74-09251 -- W74-09800

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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SELECTED WATER RESOURCES ABSTRACTS

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2A. General

SYMPOSIUM ON THE HYDROLOGY OF GLACIERS,
For primary bibliographic entry see Field 2C.
W74-09325

ON THE POSSIBILITY OF ARTIFICIAL CONTROL OF THE MASS BALANCE OF A PERENNIAL SNOW PATCH,
Nagoya Univ. (Japan). Water Research Lab.
For primary bibliographic entry see Field 2C.
W74-09342

INFLUENCE OF CHANGES IN THE GLACIERZED AREA ON SUMMER RUN-OFF IN THE PORTE DU SCEX DRAINAGE BASIN OF THE RHONE,
Eidgenoessfische Technishe Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau und Erdbau.
For primary bibliographic entry see Field 2C.
W74-09344

ROLE OF ICE RUN-OFF IN THE WATER BALANCE OF THE MOUNTAIN AREA OF CENTRAL ASIA,
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2C.
W74-09345

HYDROLOGICAL REGIME OF GLACIERS IN THE ALAY RANGE, CENTRAL ASIA,
Sredneasiatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
For primary bibliographic entry see Field 2C.
W74-09346

INFILTRATION AND RUN-OFF OF MELT WATER ON GLACIERS,
Institute of Geography, USSR Academy of Sciences, Moscow.
For primary bibliographic entry see Field 2C.
W74-09347

INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES.
For primary bibliographic entry see Field 2H.
W74-09350

PROGRESS REPORT ON THE EFFECT OF GROUND-WATER CONDITIONS ON LOCAL FLOODING IN THE KINGSTON AREA, PA.,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-09366

CALCULATION OF NATURAL CATCHMENT INFILTRATION BY COMPUTER,
National Water and Soil Conservation Organization, Wellington (New Zealand).
For primary bibliographic entry see Field 7C.
W74-09367

HYDROLOGIC DATA STORAGE AND RETRIEVAL SYSTEM,
Nevada Univ., Reno. Center for Water Resources Research.
For primary bibliographic entry see Field 7C.
W74-09401

CALIBRATION OF U.S. GEOLOGICAL SURVEY RAINFALL/RUNOFF MODEL FOR PEAK FLOW SYNTHESIS--NATURAL BASINS,
Geological Survey, Reston, Va.
P. H. Carrigan, Jr.
Available from NTIS, Springfield, Va. 22151 as PB-226 217 - Price $3.00 printed copy; $1.45 microfiche. Computer Contribution Report, September 1973. 109 p, 2 fig, 2 tab, 5 ref.

Descriptors: *Computer programs, *Calibrations, *Mathematical models, *Rainfall-runoff relationships, Peak discharge, Floods.

This program determines the parameters of a rainfall-runoff model which is used to synthesize flood peaks. The calibration is based on short-term (about 5 years) records of daily rainfall, of daily evaporation, of unit rainfall (rainfall during an interval of usually 5 to 60 minutes), and of unit discharge. The method of calibration is similar to a least squares determination of coefficients in regression analysis. The calibration adjusts 10 parameters to seek the minimum mean square error in estimating surface runoff volume and flood peak magnitude. The user may select which of 10 parameters are to be adjusted, which of the events in the list of flood peaks are to be used for calibration, and the particular mean square errors to be minimized (runoff volume, peak discharge, or both). The printed output identifies the records used for calibration, indicates periods of record and dates of events, provides comparison of observed and synthetic surface runoff volumes and peaks, and tabulates parameters and mean square errors at progressive stages in the calibration process. (Knapp-USGS)
W74-09603

WATER--A PRIMER,
California Univ., Berkeley.
L. B. Leopold.
W. H. Freeman and Company, San Francisco, Calif, 1974. 172 p.

Descriptors: *Hydrology, *Hydrologic cycle, Surface waters, Groundwater, Precipitation(Atmospheric), Streamflow, Water chemistry, Water quality, Floods, Soil-water-plant relationships, Soil water, Soil moisture, Water utilization, Evapotranspiration.

This short book is designed to cover the general principles of hydrology and the facts concerning water use that must precede consideration of the impact on the environment of man's use of the water resource. The environmental effects of resource use cannot be understood without knowledge of the occurrence and movement of water. (Knapp-USGS)
W74-09613

INDEPENDENT COMPARISON OF THREE URBAN RUNOFF MODELS,
Monash Univ., Clayton (Australia). Dept. of Civil Engineering.
D. P. Heeps, and R. G. Mein.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY7, Paper 10685, p 995-1009, July 1974. 6 fig, 4 tab, 18 ref, 2 append.

Descriptors: *Urban runoff, *Urban hydrology, *Storm runoff, Mathematical models, Rainfall-runoff relationships, Urbanization, Urban drainage.
Identifiers: *Australia.

Three urban runoff models (the Road Research Laboratory hydrograph method, the Storm Water Management Model, and the Cincinnati Urban Runoff Model) were applied to two urban catchments in Australia. The Road Research Laboratory method generally performed well if runoff from previous areas was insignificant. The Storm Water Management Model was best of the three models but also required the most computer time. The Cincinnati Urban Runoff Model contained several deficiencies which caused poor performance. Degree of catchment subdivision was an important factor in the magnitude of the peak predicted. (Knapp-USGS)
W74-09629

NEW DATA ON WATER CIRCULATION IN THE ARCTIC BASIN (NOVYYE DANNYYE O TSIRKULYATSII VOD ARKTICHESKOGO BASSEYNA),
Arkticheskii i Antarkticheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2E.
W74-09649

SOME STATISTICAL ANALYSES OF HAWAIIAN RAINFALL,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 2B.
W74-09655

2B. Precipitation

VARIATIONS IN THE RELATION BETWEEN GLACIER DISCHARGE AND METEOROLOGICAL ELEMENTS,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau und Erdbau.
For primary bibliographic entry see Field 2C.
W74-09330

PROJECT CUM II--STUDIES OF THE RAIN PARAMETERS OF RANDOMLY SEEDED WARM AND COLD CUMULI,
Weather Science, Inc., Norman, Okla.
For primary bibliographic entry see Field 3B.
W74-09370

WEATHER SITUATIONS ASSOCIATED WITH FLOODS DURING 1972,
National Weather Service, Silver Spring, Md.
For primary bibliographic entry see Field 2E.
W74-09392

AN INVESTIGATION OF THE MICROPHYSICAL AND MICROMETEOROLOGICAL PROPERTIES OF SEA FOG, FIRST SUMMARY REPORT, PROJECT SEA FOG,
Calspan Corp., Buffalo, N.Y.
E. J. Mack, R. J. Pilie, and W. C. Kocmond.
Available from NTIS, Springfield, Va. 22151 as AD-767 376 Price $3.00 printed copy; $1.45 microfiche. Technical Report No CJ-5237-M-1, May 1973. 40 p, 12 fig, 2 tab, 11 ref, append. Navy Contract N00019-73-C-0094.

Descriptors: *Fog, *Meteorology, *Cloud physics, Weather, Climatology, *California, Clouds, Water temperature, Data collections, Instrumentation.

The microphysical and micrometeorological characteristics of two fogs occurring at sea 30 nmi off the coast of California were measured. The fogs exhibited formation features, vertical temperature structure and microphysical characteristics similar to those observed on shore in California coastal fog. One of the fogs formed over cold water, while the other formed over relatively warm water; in each instance, marked visibility improvements were observed at the surface downwind of abrupt gradients in surface water temperature. Fog occurrence at the surface at distances exceeding 30 nmi off shore is definitely a diurnal effect; radiational cooling at the top of the fog is much more important than has been previously considered. (Knapp-USGS)
W74-09406

GROUND-WATER CONDITIONS CAUSED BY TROPICAL STORM AGNES,
Susquehanna River Basin Commission, Mechanicsburg, Pa.
For primary bibliographic entry see Field 4B.
W74-09532

MEAN PRECIPITATION AND SNOWFALL MAPS FOR A MOUNTAINOUS AREA OF POTENTIAL URBAN DEVELOPMENT,
Atmospheric Environment Service, Vancouver, (British Columbia).
For primary bibliographic entry see Field 2C.
W74-09612

SOME STATISTICAL ANALYSES OF HAWAIIAN RAINFALL,
Hawaii Univ., Honolulu. Water Resources Research Center.
E. D. H. Cheng, and L. S. Lau.
Available from the National Technical Information Service as PB-233 674, $3.75 in paper copy, $1.45 in microfiche. Technical Report No 72, August 1973. 63 p, 10 fig, 12 tab, 15 ref, 2 append. OWRR A-029-HI(1). 14-01-0001-3011.

Descriptors: *Hawaii, Watersheds(Basins), *Regression analysis, Rainfall, Rain gages, Precipitation(Atmospheric), Stability, Variability, *Rainfall intensity, Cloudbursts, *Statistical methods.
Identifiers: *Oahu(HI).

Monthly rainfall data of several stations in Kalihi Basin, Manoa Basin, and Kaneohe Area, all on Oahu, and the central sloping area of Molokai were correlated to watershed parameters of the areas. Distance measured from the station to a common station located seaward from all stations has proven to be the most important of the three parameters studied, the other two being the exposure and the elevation of the area. Both linear and nonlinear regression functions were developed. The central tendency of the monthly rainfall for the high rainfall part of the southeastern part of the Island of Oahu was found to require approximately forty years of record to stabilize. The analysis also shows that mean converges to a specified level generally faster than median. The intensity-duration relation of intense rain for specified recurrence interval for the high rainfall part of the Manoa Basin portrays accurately an inverse straight-line relationship on a plot of log-log coordinates, suggesting extension of effort to other climatically widely different regions in Hawaii. The developed relation agrees well with the reported finding of a prior Weather Bureau study employing a different approach.
W74-09655

2C. Snow, Ice, and Frost

SNOW SURVEY AND VEGETATION GROWTH IN HIGH MOUNTAINS (SWISS ALPS),
Zurich Univ. (Switzerland). Geographisches Institut.
H. Haefner.
Available from NTIS, Springfield, Va. 22151 as N73-23446, Price $3.00 printed copy; $1.45 microfiche. Progress Report to National Aeronautics and Space Administration, 1973. 13 p.

Descriptors: *Remote sensing, *Snow cover, *Alpine, Photogrammetry, Europe, Satellites(Artificial), Aerial photography, Mapping, Snow surveys.
Identifiers: ERTS.

A method for mapping snow over large areas combines ERTS satellite remote sensing to evaluate the exact density level of the snow cover for each individual image (or a selected section of the photo) with the higher resolution of aerial photographic techniques. Bands 4 and 5 provide the most accurate results for mapping snow. Using all four bands a separation of an old melting snow cover from a new one is possible. Regional meteorological studies combining data from ground observation, vertical temperature and humidity profiles, weather maps and meteorological satellite pictures with ERTS images describe the synoptical evolution of mesoscale and microscale meteorological systems over the Alps. (Knapp-USGS)
W74-09320

SYMPOSIUM ON THE HYDROLOGY OF GLACIERS,
Proceeding of Symposium held September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, 1973. 262 p.

Descriptors: *Glaciohydrology, *Hydraulics, *Melt water, Glaciers, Glaciology, Conferences, Infiltration, Percolation, Water yield, Water circulation, Melting, Freezing, Movement, Porous media.

An international conference was held on the hydrology of glaciers. The intention was to focus attention on those problems of glaciers in which water plays a dominant part. In the ablation zone of a glacier during the melt season streams of water flow over its surface. These streams often disappear from view into the depths of the glacier, and water from melting snow percolates downwards through the snow; and at the end of the glacier water is seen to emerge from the ice, often in the form of a single large stream. Streamflow derived from glaciers is an important resource because it is large in volume for unit area of catchment because it comes from places where precipitation is high or where snow is trapped efficiently, and it is highest in hot summers when the need is greatest. Because glacier streamflow originates at high altitudes it allows efficient generation of hydroelectric power. The use of this source of water requires understanding of the hydraulics and hydrology of glaciers. (See also W74-09326 thru W74-09349) (Knapp-USGS)
W74-09325

THE PRODUCTION, FLOW AND DISTRIBUTION OF MELT WATER IN A GLACIER TREATED AS A POROUS MEDIUM,
Geological Survey, Tacoma, Wash.
W. J. Campbell, and L. A. Rasmussen.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 11-27, 1973. 13 fig, 9 ref.

Descriptors: *Glaciohydrology, *Melt water, *Groundwater movement, Glaciers, Water balance, Water yield, Unsteady flow, Simulation analysis, Ablation, Mathematical models, Snowpacks, Firn, Porous media.
Identifiers: *South Cascade Glacier.

The meltwater outflow of a glacier was studied in relation to its meteorological environment in South Cascade Glacier by devising a flow law for water movement within the glacier and devising a method to compute the ice-melt over the entire glacier surface for short time scales to obtain a realistic input. The glacier is assumed to be a porous medium in which a Darcy flow exists. This law is combined with the continuity equation for free surface flow to yield an equation which describes the flow and distribution of melt water for an arbitrarily shaped glacier for which the spatial and temporal melt-water input is known. This model was applied to South Cascade Glacier for August 11-16, a period in which the dominant part of the energy balance was radiative. The daily nonradiative melt and long-wave melt during the periods studied amounted to slightly less than one-third of the total melt. This was assumed to be constant and uniform over the glacier during the period modelled. The shape of the bed has a primary effect on the character of the outflow curve. For the actual bed the outflow curve closely resembles the observed outflow. The internal flow solutions show a multiple water transport wave. Although this model is based on a simple physical concept, it reasonably approximates the outflow from a real glacier and offers some ideas for the flow of water within the glacier. (See also W74-09325) (Knapp-USGS)
W74-09326

GLACIER DISCHARGE SIMULATION BY GROUND-WATER ANALOGUE,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
L. Derikx.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 29-40, 1973. 6 fig, 1 tab, 11 ref, append.

Descriptors: *Glaciohydrology, *Melt water, *Groundwater movement, Glaciers, Canada, Water balance, Water yield, Unsteady flow, Simulation analysis, Ablation, Mathematical models, Snowpacks, Firn, Porous media.

To simulate discharge from a glacier, the drainage basin is considered analogous to a groundwater system. The daily input into the system is precipitation and water from melting snow and ice computed from meteorological data. Outflow rates are computed by use of methods originally derived for nonsteady groundwater flow. The daily discharge of a glacial stream is the output of a system operating by the linearized Boussinesq's equation with time-invariant boundary conditions. The parameter of the system is dependent on the type of glacier, time of year, climate, and probably the slope of the glacier surface. Data from Peyto Glacier, Alberta, Canada, for the ablation period 1968 were used to test the preliminary discharge-simulation model. (See also W74-09325) (Knapp-USGS)
W74-09327

ANALYSIS OF THE RUN-OFF AND FLOW ROUTING FOR A MOUNTAIN GLACIER BASIN,
Moscow State Univ., (USSR).
G. N. Golubev.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 41-50, 1973. 4 fig, 4 ref.

Descriptors: *Glaciohydrology, *Ablation, *Routing, Melt water, Runoff forecasting, Melting, Snowmelt, Firn, Water balance, Base flow, Hydrograph analysis.

The difference between the values of the inflow of melted ice or water on the surface of a glacier and the runoff for short periods of time is due to the stream-flow control by the glacier. The average basin lag is directly dependent on the area of a glacier. The stream-flow control of the firn area is greater than that of the glacier tongue, and the basin lag of the firn area is approximately ten times longer. This difference is due to the fact that day peaks are a result of runoff from the glacier tongue, and the base flow of the hydrograph is a result of runoff from the firn. For a period of time of sufficient duration, it is possible to calculate directly the runoff by ablation, disregarding the stream-flow control. Such a period of time is a function of the glacier area. For short periods of time, calculation of the glacier runoff is by ablation taking into account the stream-flow control. For this purpose three methods of calculation are suggested: (1) flood-wave routing, (2) the time-area-concentration curve, and (3) the unit hydrograph. (See also W74-09325) (Knapp-USGS)

W74-09328

WATER MOVEMENT THROUGH THE GORNERGLETSCHER,
Hull Univ., (England). Dept. of Geography.
G. R. Elliston.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 79-84, 1973. 3 fig, 3 tab, 1 ref.

Descriptors: *Glaciohydrology, *Water level fluctuations, Ablation, Melt water, Discharge(Water), Base flow, Stream gages, Glaciers, Glaciology, Melting.
Identifiers: *Switzerland(Gornergletscher).

On the river draining the Gornergletscher, a diurnal rhythm in water levels is superimposed upon a base flow whose volume varies more slowly. When summer snowfalls greatly reduce ablation and runoff, the diurnal rhythm disappears and there is a slower decline in the base flow over several days until bare ice reappears. Even when ablation is renewed at a high rate, the daily rhythm does not resume its former amplitude for several days until the base flow also recovers its former volume. The peak flow in the daily rhythm occurs earlier in the day as the summer progresses, and the time constant lessens during the ablation season. It is suggested that during the ablation season a large quantity of water is present in the body of the glacier in reservoirs which are continuously draining out but which are topped up intermittently by melt water. The rate of discharge of the main outlet depends upon the hydrostatic pressures in the reservoirs, and the diurnal rhythm is mainly a reaction to diurnal changes in the hydrostatic pressure. During the ablation season the reservoir exits are enlarged, enabling the rate of discharge to increase. (See also W74-09325) (Knapp-USGS)
W74-09329

VARIATIONS IN THE RELATION BETWEEN GLACIER DISCHARGE AND METEOROLOGICAL ELEMENTS,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau und Erdbau.
H. Lang.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 85-94, 1973. 5 fig, 3 tab, 4 ref.

Descriptors: *Glaciohydrology, *Ablation, *Melt water, Water yield, Meteorology, Snow cover, Precipitation(Atmospheric), Regression analysis, Temperature, Discharge(Water), Glaciers.

For two glacierized drainage basins in the Swiss Alps (Aletschgletscher: 195 sq km drainage area, 67% glaciers; and Rosegletscher: 67sq km drainage area, 33% glaciers), some of the characteristics of the variations in the relation between discharge and meteorological elements which occur in the course of an ablation season were studied. The daily values of 4 years of records were treated by regression techniques with discharge as a dependent variable and air temperature, sunshine duration, vapor pressure and precipitation as independents. The ablation seasons were subdivided into four periods; each interval taken over the 4 years of records provided one sample. The results of the regression analysis clearly show the influence of the variable snow cover and its areal distribution for both drainage basins. The differences in the altitude distributions of total and of glacier area between the two drainage basins are reflected particularly by the correlation between discharge and temperature respectively to precipitation. The multiple correlation coefficients verify the vapor pressure as an important variable. The maximum in the correlation function of discharge and air temperature was taken to determine the mean delay in melt-water runoff; in the course of the ablation season the delay decreases from about 2-3 to about 1-2 d. A recession coefficient, calculated from mean daily variations of discharge from the Aletschgletscher basin, indicates a very significant decrease in runoff delay from June to July. (See also W74-09325) (Knapp-USGS)
W74-09330

RECORD OF TWO JOKULLHLAUPS,
British Columbia Univ., Vancouver. Dept. of Geology.
W. H. Mathews.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 99-110, 1973. 3 fig, 3 tab, 9 ref.

Descriptors: *Glaciohydrology, *Canada, *Discharge(Water), *Floods, Peak discharge, Lakes, Water levels, Glaciology.
Identifiers: *Jokullhlaups, Glacial outburst floods, Salmon Glacier(B C).

A record of two jokullhlaups, from Summit Lake, British Columbia, Canada, through Salmon Glacier was obtained from observations on falling lake levels, lake areas, and surface outflow, plus estimates of inflow. The rate of leakage through Salmon Glacier increased sharply with time, and seems related to the 3/2 power of the volume of water previously lost. The effective tunnel diameter in the ice at the end of the two jokullhlaups was 12.5-13 m. Development of a tunnel of this size by mechanical erosion is not in accord with the ratio of ice to water leaving the tunnel; instead enlargement by melting seems more likely. Only a part of the heat energy available from loss of hydraulic head seems to be needed to develop the tunnel. Water temperatures calculated for the overflow of the tunnel are, in general, consistent with this hypothesis. Sealing of the escape route for the water requires as little as 2 days. (See also W74-09325) (Knapp-USGS)
W74-09331

SUBGLACIAL LEAKAGE OF SUMMIT LAKE, BRITISH COLUMBIA, BY DYE DETERMINATIONS,
Department of the Environment, Ottawa (Ontario). Inland Water Branch.
D. Fisher.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 111-116, 1973. 3 fig, 2 tab, 10 ref.

Descriptors: *Glaciohydrology, *Canada, *Discharge(Water), *Floods, Peak discharge, Lakes, Water levels, Glaciology, Tracers, Dye releases.
Identifiers: Jokullhlaups, Glacial outburst floods, Salmon Glacier(B C).

Summit Lake, British Columbia, is dammed by Salmon Glacier and periodically drains catastrophically under the ice. In order to test for continuous leakage under the ice in the interval between the catastrophic discharges, fluorescent rhodamine dye was place in the lake. The dye was detected in the Salmon River below the glacier on each of three separate tests, and it was concluded that a continuous leak existed. From estimates of the velocity of the water, it was concluded that the water flowed along a plane approximately 2 mm thick. An explanation of the emptyings is related to the glacier's water content. (See also W74-09325) (Knapp-USGS)
W74-09332

SOME VIEWPOINTS ON THE INTERNAL DRAINAGE OF GLACIERS,
Uppsala Univ. (Sweden). Dept. of Physical Geography.
T. Stenborg.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 117-129, 1973. 7 fig, 22 ref.

Descriptors: *Glaciohydrology, *Melt water, *Ablation, Streamflow, Runoff, Drainage, Melting, Groundwater movement, Porous media.
Identifiers: *Internal drainage(Glaciers).

The superficial systems of oblique tensile crevasses on a glacier tongue will lead to a division of the drainage, which on the two glaciers studied, persists down to the frontal streams. The general possibilities and conditions for this model with two quite separate internal drainage systems are discussed in relation to the glaciers studied and with reference to similar glacier tongues in general. Some possibilities of drainage penetration are also discussed from a theoretical point of view. A general model involves the mutual influences of superficial and internal drainage, glacier movement and runoff. The beginning of the summer is characterized by some melting, small amounts of runoff, a high ice velocity influenced by the increasing storage of water in and under the glacier. Then the internal drainage develops under the influence of the frequent crevassing and wastage of the snow and superimposed ice that have blocked the old drainage courses superficially. Runoff often reaches its summer maximum at this time. From the further development of drainage courses, higher rates of runoff recession follow, the temporarily stored water is gradually drained, and the ice velocity decreases during the rest of the summer. (See also W74-09325) (Knapp-USGS)
W74-09333

GEYSER-LIKE WATER SPOUTS AT WERENSKIOLDBREEN, SPITSBERGEN,
Wrocfawski Univ. (Poland). Inst. of Geography.
S. Baranowski.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 131-133, 1973. 2 fig, 6 ref.

Descriptors: *Glaciohydrology, *Discharge(Water), Water pressure, Movement, Flow, Freezing, Melt water.
Identifiers: *Spitsbergen, Werenskioldbreen.

Enormous water spouts were observed on Werenskioldbreen, a glacier in Spitsbergen, at noon on July 28, 1957. They appeared in regular cycles resembling geyser water eruptions. Each cycle of nearly 3 min duration started with a strong burst of water (60 m in height), after which the next three or four increasingly smaller spouts occurred at intervals of 8-10 s. The water spouts were related to the rainfall and the strong ablation that had taken place during the previous night. Large volumes of water that ran off the glacier surface and penetrated to the glacier bed were probably dammed on their way to the snout of the glacier by the cold ice of the glacier peripheral zone. As a result of this, a subglacial lake with gradually increasing hydrostatic pressure was formed, the pressure eventually causing a crack. Part of the water was forced into the crack. Due to ice pressure, the fissure tended to close either at the base or near the surface of the glacier, thus causing the breaks in the spout of one cycle. (See also W74-09325) (Knapp-USGS)
W74-09334

CAN A WATER-FILLED CREVASSE REACH THE BOTTOM SURFACE OF A GLACIER,
Northwestern Univ., Evanston, Ill. Dept. of Materials Science.

J. Weertman.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 139-145, 1973. 6 fig, 7 ref, append.

Descriptors: *Glaciers, *Rheology, *Melt water, *Glaciohydrology, Creep, Deformation, Glaciology.
Identifiers: *Crevasses(Glacial).

A crevasse filled with water up at least 97.4% of its depth can penetrate to the bottom of a glacier. Water-filled cavities can exist directly beneath water filled crevasses. The pressure of water pushing against the walls of the crevasse acts as wedge force to cause further penetration into the glacier. (See also W74-09325) (Knapp-USGS)
W74-09335

GLACIAL ORIGIN OF PRO-GLACIAL BOULDERS,
Newcastle-upon-Tyne Univ. (England). Dept. of Geography.
H. Lister.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 151-155, 1973. 6 fig, 1 tab, 5 ref.

Descriptors: *Deposition(Sediments), *Sediment transport, *Glaciohydrology, Velocity, Melt water, Particle size, Boulders, Glaciers, Glacial sediments.
Identifiers: *Pro-glacial boulders.

The size of cobbles and boulders in pro-glacial streams indicates the stream velocity required to transport them. This velocity is generally greater than the existing channel shape can accommodate. Deposition of supraglacial debris is adequate explanation of the presence of these boulders only where adjacent to medical moraines. Subglacial deposition is the only apparent alternative. This progression is demonstrated by analysis of data from Vestspitsbergen and Sweden. Results indicate discrete, though temporary, subglacial channels. (See also W74-09325) (Knapp-USGS)
W74-09336

HYDROLOGY OF THE INTERGRANULAR VEINS IN A TEMPERATE GLACIER,
Bristol Univ. (England). H. W. Wills Physics Lab.
J. F. Nye, and F. C. Frank.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 157-161, 1973. 3 fig, 2 tab.

Descriptors: *Glaciohydrology, *Porous media, Pores, Saturated flow, Melt water, Permeability, Groundwater movement, Ice, Cryology, Leaching, Solutes.
Identifiers: *Intergranular veins(Glacial).

Pore space in glacial ice was analyzed by using surface-energy considerations together with measurements of dihedral angle. In pure polycrystalline ice in equilibrium at the melting point the water phase is situated in channels at three-grain intersections. The channels join together in fours at the four-grain intersections in tetrahedra having concave non-spherical faces. This implies that ice at the melting point is permeable to water. A temperature glacier is filled with a three-dimensional network of veins of water between the grains. The water flows downwards, replenished by melt water from the surface and by melt produced by heat of deformation within the glacier, at a rate that depends on the fractional volume occupied by the water. This can adjust itself to carry the flow supplied; kinematic waves with sharp shock fronts will therefore be possible. The most important function of the vein system may be that it provides an efficient means of flushing impurities into and out of the glacier. (See also W74-09325) (Knapp-USGS)
W74-09337

VELOCITY FLUCTUATIONS AND WATER REGIME OF ARCTIC VALLEY GLACIERS,
Axel Heiberg Expedition, Montreal (Quebec).
F. Muller, and A. Iken.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 165-182, 1973. 8 fig, 4 tab, 26 ref, append.

Descriptors: *Glaciers, *Movement, *Glaciohydrology, *Canada, Arctic, Melt water, Rheology, Ablation, Water balance, Temperature, Water circulation, Discharge(Water).

Surface movement, ablation and, to some extent, runoff were measured in the ablation are of cold valley glaciers, particularly White Glacier on Axel Heiberg Island (lat. 80% N.) in the Canadian Artic Archipelago from 1959 to 1969. The annual, seasonal and short-period velocity fluctuations were most strongly linked to the discharge capacity of the drainage system. However, changes in glacier thickness, ice temperature near the bed, and longitudinal stress gradient are also influential. Intraglacial, water-activated glide planes were observed. (See also W74-09325) (Knapp-USGS)
W74-09338

JERKY GLACIER MOTION AND MELT WATER,
Ohio State Univ., Research Foundation, Columbus. Inst. for Polar Studies.
R. P. Goldthwait.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 183-188, 1973. 2 fig, 1 tab, 12 ref.

Descriptors: *Glaciers, *Movement, *Melt water, Rheology, Faults(Geologic), Pores, Crystallography, Creep.

Jerky motion was found in 5 glaciers. Jerky quick-slip motion was found only in the upper surface of the ice. Instantaneous surface slips measured 0.1 to 15 mm and the intervals between measurable slips are 5 to 529 min. The magnitude of displacement increases with increased time interval. The mechanism causing these displacements seems to be fault slip where the shear stress exceeds the strength of less ductile surface ice. Longer-term velocities (0.2-50 mm/h) accelerate in long sunny periods or heavy rain periods and especially during the summer high-energy period. Motion at the bottom of temperate (Casement Glacier) or cold (Meserve Glacier) glaciers was smooth, not jerky, even where basal slip was the manner of displacement. Where there were jerky motions at the surface, they are somewhat more intense in late evening or early morning of bright or sunny days. Motion of this sort leads to the hypothesis that jerky surficial motion is caused by water development at crystal boundaries and pore-pressure changes akin to those now throught to produce earthquakes. (See also W74-09325) (Knapp-USGS)
W74-09339

WATER AT THE BED OF A GLACIER,
Bristol Univ. (England). H. W. Wills Physics Lab.
J. F. Nye.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 189-194, 1973. 3 fig, 8 ref, append.

Descriptors: *Glaciohydrology, *Erosion, Scour, Melt water, Freezing, Melting, Ice, Cryology, Discharge(Water).

The melt water at the bottom of a temperature glacier, or at the bottom of a cold glacier or ice sheet that has a temperature base, is in channels, rather than in a continuous film; a consideration of the relative permanence of these channels leads to the conclusion that, while there may be temporary channels incised upwards into the ice, there will be comparatively permanent channels cut downwards into the rock bed. (See also W74-09325) (Knapp-USGS)
W74-09340

SEASONAL VARIATIONS IN THE TRITIUM ACTIVITY OF RUN-OFF FROM AN ALPINE GLACIER (KESSELWANDFERNER, OETZTAL ALPS, AUSTRIA),
Innsbruck Univ. (Austria). Dept. of Physics.
W. Ambach, H. Eisner, and M. Url.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 199-204, 1973. 3 fig, 3 ref.

Descriptors: *Tracers, *Melt water, *Ablation, *Glaciohydrology, *Tritium, Firn, Snowmelt, Rainfall, Water balance, Ice, Springs, Radioactivity techniques.

Runoff water of a glacier consists of components of different origins: melted snow (in some cases firn layers deposited during previous years), melted old glacial ice, spring-water, and rain. Water from melted snow differs from that of old glacial ice in having comparatively high tritium values. For this reason, there is a significant decrease in radioactivity of melt water from the ablation area during the summer ablation period. Diurnal variations of activity were also measured. (See also W74-09325) (Knapp-USGS)
W74-09341

ON THE POSSIBILITY OF ARTIFICIAL CONTROL OF THE MASS BALANCE OF A PERENNIAL SNOW PATCH,
Nagoya Univ. (Japan). Water Research Lab.
K. Higuchi.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 207-212, 1973. 3 fig, 15 ref.

Descriptors: *Snowpacks, *Water balance, *Melting, Ablation, Glaciers, Glaciology, Insulation, Weather modification.
Identifiers: *Glaciers(Artificial).

A perennial snow patch develops during periods with much snow in winter and low temperature in summer and dissipates during periods with less snow and higher summer temperature. Therefore, a perennial snow patch would grow to a cirgue glacier if the accumulation could be increased and the ablation could be reduced when the dissipation of the snow patch would occur under natural climatic conditions. From field experiments it was concluded that sheets of polystyrene foam insulator were the best material to cover the snow surface in order to reduce melting. (See also W74-09325) (Knapp-USGS)
W74-09342

SIMPLE METHOD OF MEASURING THE AVERAGE AMOUNT OF WATER PRODUCED ANNUALLY BY MELTING OF ICE ON A GLACIER,
Water Survey of Canada, Ottawa (Ontario).
I. A. Reid, and W. S. B. Paterson.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge,

England: International Association of Scientific Hydrology Publication No 95, p 215-218, 1973. 1 fig, 4 ref.

Descriptors: *Ablation, *Melting, *Water balance, *Glaciers, *Glaciohydrology, Water yield, Melt water, Water storage, Ice, Water measurement.

In a glacier in a steady state, the amount of ice flowing through the cross-section at the equilibrium line in a year equals the total annual ablation in the ablation area. Also, at each point in the ablation area, the component of velocity perpendicular to the surface equals the thickness of ice lost in a year. These relations provide simple methods of estimating the average annual loss of ice from the ablation area. Data from Athabasca Glacier illustrate the methods. (See also W74-09325) (Knapp-USGS)
W74-09343

INFLUENCE OF CHANGES IN THE GLACIERZED AREA ON SUMMER RUN-OFF IN THE PORTE DU SCEX DRAINAGE BASIN OF THE RHONE,
Eidgenoessfische Technishe Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau und Erdbau.
P. Kasser.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 221-225, 1973. 4 fig, 1 tab, 6 ref.

Descriptors: *Glaciohydrology, *Runoff, *Melt water, Runoff forecasting, Temperature, Ablation, Water yield, Correlation analysis, Water balance, Hydrologic budget.
Identifiers: *Switzerland(Rhone River).

The glacierized area of the drainage basin of the Rhone represented 17.9% of the total area in 1876, 16.8% in 1916, 14.7% in 1955 and 13.6% in 1968. The influence of the change in the glacierized area on the runoff figures from April to September was demonstrated for the period 1915/55 by regression of the summer runoff figures on the winter precipitation, winter runoff, summer precipitation, summer temperatures and change of area. The partial coefficient of correlation for the change of area, r=0.384, is significant at level 98.9%. The regression coefficient of the change of area corresponds to a relationship of 10 degree days for the formation of 48 kg/sq m of water from melted ice, relative to the change of area, as against 55 kg/sq m obtained empirically from measurements on ablation stakes. The residuals of the regression equation, which takes no account of the change of area, shows a significant trend in the period 1916/68. This trend vanishes when the change of area is introduced as a variable or when its effect is eliminated by a relation between degree days and the formation of water from melted ice. (See also W74-09325) (Knapp-USGS)
W74-09344

ROLE OF ICE RUN-OFF IN THE WATER BALANCE OF THE MOUNTAIN AREA OF CENTRAL ASIA,
Akademiya Nauk SSSR, Moscow. Institut Geografii.
I. D. Tsigel'naya.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 227-230, 1973. 1 fig, 2 tab, 6 ref.

Descriptors: *Runoff, *Ice, *Melt water, Water balance, Hydrologic budget, Glaciers, Glaciohydrology, Water yield, Asia.
Identifiers: *USSR(Central Asia).

The ice runoff resources of the mountain areas of Central Asia are as follows: Uzbek SSR, 2.1 cu km; Tajik SSR, 16.0 cu km; and Kirgiz SSR, 12.4 cu km. Precipitation was estimated by the annual isohyetal maps in the glacial-nival zone at the boundary of the glacier reservoir. The ablation at this glaciological level is equal to the accumulation. The proportion of the ice constituent in the total mountain runoff in Central Asia ranges from 5% to 83%, with an average of 25-32%. (See also W74-09325) (Knapp-USGS)
W74-09345

HYDROLOGICAL REGIME OF GLACIERS IN THE ALAY RANGE, CENTRAL ASIA,
Sredneasiatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
V. F. Suslov, and A. A. Akbarov.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 235-238, 1973. 1 fig, 2 tab, 5 ref.

Descriptors: *Glaciohydrology, Glaciation, Runoff, Melt water, Ice, Mountains, Water balance, Hydrologic budget, Snowmelt, Discharge(Water), Water yield, *Glaciers.
Identifiers: *USSR(Alay Range).

The main geographical regularity in the glacierization of the Alay range, USSR, is its gradual dimensional diminuation in a west to east direction. The altitude of the firn line and the location of glaciers increase in the same direction, while the vertical amplitude and degree of glacierization decrease. At the present time the areas of most of the glaciers in the Alay range are diminishing. A characteristic feature is the clear-cut relationship of all the glaciological and hydrological indices to the changing oroclimatic conditions within the range. The average total runoff from the glaciers of the Alay range is 33.2%. The proportion of runoff (derived from melting ice) in the annual river discharge is 16.8%. The proportion of melt water (derived from melting ice) in the rivers of the western part of the range is considerably smaller than in the rivers of the eastern part; this is explained by the greater amount of precipitation and later exposure of the surface of the glaciers from beneath the snow cover. The proportion of runoff from the melting of seasonal snow on the surface of glaciers decreases from west to east according to the precipitation decrease. The highest runoff from modulus of 0.085 cu m per sec has been observed in the western part of the range, whereas in its eastern part it may be as low as 0.018. The total discharge from the glaciers of the Alay range is 1.6 cu km, which is about 8% of the annual discharge of all the rivers of Central Asia. (See also W74-09325) (Knapp-USGS)
W74-09346

INFILTRATION AND RUN-OFF OF MELT WATER ON GLACIERS,
Institute of Geography, USSR Academy of Sciences, Moscow.
A. B. Bazhev.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 245-250, 1973. 2 fig, 2 tab.

Descriptors: *Melt water, *Infiltration, *Glaciohydrology, *Snowpacks, *Firn, Melting, Movement, Glaciology, Glaciers, Ice, Freezing.

Melt and rain-water infiltration into a firn pack was studied. In autumn at the beginning of snow accumulation a pit was dug and the old firn surface was marked with methyl dye. In spring before melting began, the pit was reopened and the pack structure was described in detail and its water content was evaluated by layers. This was done at regular intervals during the whole summer. Temperature changes were measured in an adjacent bore hole. From an average rate along the whole cross-section of 4.5 cm per day in the upper part, infiltration rate smoothly increases with depth reaching its maximum of 25 cm per day at the bottom of the snow pack. At the interface with the firn the rate sharply drops down almost to 2 cm per day. Deeper in the firn the rate curve has the nature of a sinusoid with an amplitude decreasing with depth. The curve of the change in the rate of infiltration front movement reflects the influence of two factors: cold storage and water content of the pack. Cold storage slows down the infiltration most in the upper part of the cross-section and its effect diminishes with depth. Water content suppresses the infiltration in the upper layers only slightly and in the lower ones to a much greater extent. Along with a rapid decrease of water permeability downward the infiltration rate becomes variable because of the occurrence of ice layers and lenses. Melt water on glaciers is not only the major source of warming the cold layers in the pack, but a considerable part remains in the firn in the liquid state until the autumn-winter freezing. At middle latitudes the layer of thick firn packs affected by infiltration processes is thicker, and they are more saturated with water. On the whole more melt water remains in a liquid state in winter at these latitutdes. The warmer the glacier regime, the greater the autumn-winter internal accumulation. (See also W74-09325) (Knapp-USGS)
W74-09347

ESTIMATION OF RUN-OFF FROM ANTARCTIC AND GREENLAND ICE SHEETS,
Akademiya Nauk SSSR, Moscow. Vsesoyuznyi Institut Nauchnoi i Teknicheskoi Informatsii.
K. S. Losev.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 253-254, 1973.

Descriptors: *Runoff, *Water balance, *Hydrologic budget, *Glaciers, *Antarctic, Icebergs, Glaciation, Glaciology.
Identifiers: *Greenland ice sheets.

The rate of calving the icebergs from the Antarctic ice sheet suggests that the estimates of ice loss which have been used in previous estimates of Antarctic mass balance are too low. A new estimate, based on three different methods, suggests that the combined output from Greenland and Antarctic ice sheets is more than 3000 cu km per year. The annual runoff from the Antarctic ice-sheet was calculated on the basis of mass balance, iceberg volume, and by comparison with Greenland. The three methods yield similar results. (See also W74-09325) (Knapp-USGS)
W74-09348

STRUCTURE AND INFERRED CIRCULATION OF SOUTH CASCADE LAKE, WASHINGTON, U.S.A.,
Geological Survey, Tacoma, Wash.
W. J. Campbell.
In: Proceedings of Symposium on the Hydrology of Glaciers, September 7-13, 1969, Cambridge, England: International Association of Scientific Hydrology Publication No 95, p 259-262, 1973. 3 fig, 2 ref.

Descriptors: *Limnology, *Thermal stratification, *Melt water, Lakes, Glaciers, Washington, Water circulation, Glaciohydrology, Water temperature.
Identifiers: *Washington(South Cascade Lake).

To elucidate the dynamic interplay between South Cascade Glacier and its terminal lake, a series of limnological measurements begun in 1966 include summer and winter profiles of temperature, oxygen concentration, and specific conductivity. In the summer, suspended sediment profiles were obtained, and the temperature structure of the epilimnion was measured in detail using thermistors, thermocouple probes, and infra-red

radiometers. In the summer an intense shallow epilimnion with a sharp thermocline is generated by the absorption of solar radiation by the highly turbid water. When this epilimnion persists throughout the summer the circulatory mode of the lake is dimictic; when it is transitory the mode is polymictic. In winter an inverse double thermocline is formed, with the oxygen-saturated glacier melt water flowing along the epilimnion at the ice bottom and out the lake, while the zone between the two thermoclines (10-30 m) is a region of slow return flow towards the glacier terminus or slow-moving convective cells. In the winter hypolimnion below 30 m depth apparently little motion occurs. (See also W74-09325) (Knapp-USGS)
W74-09349

CHLORIDE AND LEAD IN URBAN SNOW,
Department of the Environment, Ottawa (Ontario). Water Quality Div.
For primary bibliographic entry see Field 5B.
W74-09468

GREAT LAKES ICE COVER, WINTER 1971-72,
National Ocean Survey, Detroit, Mich.
R. A. Assel.
Available from NTIS, Springfield, Va. 22151 as COM-73-11746, Price $5.25 printed copy; $1.45 microfiche. National Oceanic and Atmospheric Administration Technical Memorandum NOS LSC D 6, October 1972. 57 p, 46 fig, 2 tab.

Descriptors: *Ice cover, *Surveys, *Great Lakes, *Iced lakes, Lake Superior, Lake Huron, Lake Michigan, Lake Ontairo, Lake Erie, Lake ice, Aerial photography.

Ice cover was measured on the Great Lakes in the winter of 1971-72. Thirty-five ice charts were produced from data collected on 23 Lake Survey Center ice reconnaissance flights. In addition, five summary ice charts, illustrating ice distribution patterns for short intervals during the winter over the entire Great Lakes, were produced. The 1971-72 winter was severe on western Lake Superior and near normal throughout the remainder of the Great Lakes. Ice formation was reported November 10 in western Lake Superior at Duluth Harbor and along the perimeter of all the Great Lakes by the end of January. The period of maximum ice cover varied from the second week of February to the last week of March for individual lakes. During this time maximum ice cover was estimated to be as follows: Lakes Superior and Erie, 95%; Lake Michigan, 40%; Lake Huron, 70%; and Lake Ontario, 20%. Ice covers begin to decrease during March. Last reported ice ranged from May 5 for the lower lakes in the Niagara River to June 8 for the upper lakes in western Lake Superior. (Knapp-USGS)
W74-09588

AVALANCHE STUDIES IN THE SAN JUAN MOUNTAINS OF SOUTHWESTERN COLORADO,
Colorado Univ., Nederland. Inst. of Arctic and Alpine Research.
R. L. Armstrong.
Proceedings for sale by Western Snow Conference, R. T. Davis, Secretary, Rm. 360, U.S. Courthouse, Spokane, Wash. 99201 - Price $3.00. In: Proceedings of the 41st Annual Meeting of the Western Snow Conference, April 17-19, 1973, Grand Junction, Colorado: Colorado State University, Fort Collins, p 44-51, 1973. 2 fig.

Descriptors: *Avalanches, *Snowpacks, Snow, Snow cover, Instrumentation, Mountains, Topography, Colorado, Weather, Meteorology, Temperature.
Identifiers: *San Juan Mountains(Colo).

The causes of snow avalanches in the San Juan Mountains of southwestern Colorado were studied to develop a forecast model to predict avalanche occurrence. In addition, the project was designed to evaluate the possibilities of increased avalanche activity which could result from winter cloud seeding activities. The terrain onto which snow is deposited influences the snow stability in many ways. In terms of surface characteristics only, the maximum instability will probably develop on smooth, grassy slopes while maximum stability will be found on heavily forested slopes. Surface features, such as boulders and forest cover, which are higher than the mean thickness of the snow cover act as an anchor; an avalanche will normally not occur until such time as snow depth exceeds the mean height of such closely spaced surface irregularities. Widely spaced or isolated obstacles have little stabilizing effect. It is generally considered that a basic correlation between slope angle and avalanche frequency does exist. While they do occur, avalanches are rare on slopes greater than 60 deg and less than 25 deg. A strong relationship exists between the amount and type of snow cover that develops within a particular slide path and the orientation of the ridge system associated with the slide path. The orientation of the ridge with respect to the wind direction during a given storm will determine to a considerable degree the precipitation pattern of that storm in terms of the local topography. With the aid of USGS maps, the orientation of both the slide paths and associated ridge systems, as well as mean angles of the slide paths were established for the study area. Fixed instrumentation was utilized to measure meteorological parameters, determine snowpack depth, density, and stratigraphy, and to detect avalanche events. (Knapp-USGS)
W74-09607

SNOW SAMPLING TECHNIQUES ON A SMALL SUBALPINE WATERSHED,
Wyoming Univ., Laramie. Water Resources Research Inst.
L. R. Bartos, and P. A. Rechard.
Proceedings for sale by Western Snow Conference, R. T. Davis, Secretary, Rm. 360, U.S. Courthouse, Spokane, Wash. 99201 - Price $3.00. In: Proceedings of the 41st Annual Meeting of the Western Snow Conference, April 17-19, 1973, Grand Junction, Colorado: Colorado State University, Fort Collins, p 52-61, 1973. 9 tab, 5 ref.

Descriptors: *Snow surveys, *Snowpacks, *Water equivalent, Water yield, Runoff forecasting, Streamflow forecasting, Sampling, Water measurement.

The study was located in the Nash Fork Basin of the Snowy Range in southeastern Wyoming. The research was conducted on a watershed of 744 acres at elevations ranging from 10,200 to 10,600 feet above mean sea level. The areal mean water equivalent of snow on a watershed can be determined more precisely, with little increase in effort, by a transect of many snow depth measurements and few snow density measurements. It is possible to develop a close estimate of the water equivalent on a small watershed by means of such a transect. When measuring depths independently of densities, the relative number of depth to density samples required on the subalpine watershed studied was 2:1 in forested cover and 5:1 in the open wind-influenced area for each elevation. (Knapp-USGS)
W74-09608

A COMPARISON OF TECHNIQUES OF SAMPLING THE ARCTIC-SUBARCTIC SNOWPACK IN ALASKA,
Soil Conservation Service, Anchorage, Alaska.
A. G. Crook, and T. G. Freeman.
Proceedings for sale by Western Snow Conference, R. T. Davis, Secretary, Rm. 360, U.S. Courthouse, Spokane, Wash. 99201 - Price $3.00. In: Proceedings of the 41st Annual Meeting of the Western Snow Conference, April 17-19, 1973, Grand Junction, Colorado: Colorado State University, Fort Collins, p 62-68, 1973. 6 fig, 1 tab, 3 ref.

Descriptors: *Sampling, *Snow surveys, Water equivalent, Water yield, Stratigraphy, Snowpacks, Alaska.

Snowpack data are being gathered in Alaska by several procedures including CRREL observations and snow course surveys using Federal samplers. Values obtained by either method can be estimated using data from the other procedure. CRREL observations yield slightly higher density values than Bowman observations in light density snowpacks. The difference tends to diminish as density increases. Overmeasurement is a result, at least in part, of sampling strata of depth hoar crystals. Deeper snowpacks were characterized by higher densities and the fact that a smaller proportion of the profile has been metamorphosed to depth hoar crystals. The CRREL procedure overmeasure may be inversely proportional to density. The Bowman method offers a convenient, accurate, and reliable alternative for collecting snow depth and snow water equivalent and has a note-reduction procedure that allows for convenient onsite validity checks. The CRREL procedure gives a much more complete description of the stratigraphy of a snowpack. Onsite validity checks can be made most conveniently by routine replicate sampling within each horizon. Each procedure originated because of a specific need: CRREL to describe the profile and Bowman to determine water equivalent. Each is a well-suited method of collecting these data. (Knapp-USGS)
W74-09609

SNOW LOAD ANALYSIS AND RECREATIONAL USES OF SNOW DATA,
T. A. George, and D. W. McAndrew.
Proceedings for sale by Western Snow Conference, R. T. Davis, Secretary, Rm. 360, U.S. Courthouse, Spokane, Wash. 99201 - Price $3.00. In: Proceedings of the 41st Annual Meeting of the Western Snow Conference, April 17-19, 1973, Grand Junction, Colorado: Colorado State University, Fort Collins, p 69-74, 1973. 6 fig, 12 ref.

Descriptors: *Snow surveys, *Winter sports, *Loads(Forces), Snowpacks, Recreation, Sampling, Ice loads, Snow cover.
Identifiers: *Snow loads.

In any deep snow zone area that is having or expects considerable urban development, there is a definite need for snow load data. If basic data are not available from existing snow courses, short-term snow courses throughout the elevation range could be established. After a few years of record, these short-term courses may be correlated to other similar courses in the region with longer periods of record, and be used to determine snow loads. When a specific site is being contemplated for a winter recreation area, it is desirable to install a few short-term snow courses for snowpack evaluation of the area. The short-term records collected while the proposed area is in the feasibility study period can be compared directly with long-term data, thereby giving the short-term snow courses more reliability and more meaning. (Knapp-USGS)
W74-09610

EVAPORATION LOSSES OF WINDBLOWN SNOW, AND THE POTENTIAL FOR RECOVERY,
Rocky Mountain Forest and Range Experiment Station, Laramie, Wyo.
For primary bibliographic entry see Field 2D.
W74-09611

MEAN PRECIPITATION AND SNOWFALL MAPS FOR A MOUNTAINOUS AREA OF POTENTIAL URBAN DEVELOPMENT,
Atmospheric Environment Service, Vancouver, (British Columbia).
D. G. Schaefer, and S. N. Nikleva.

Proceedings for sale by Western Snow Conference, R. T. Davis, Secretary, Rm. 360, U.S. Courthouse, Spokane, Wash. 99201. Price $3.00. In: Proceedings of the 41st Annual Meeting of the Western Snow Conference, April 17-19, 1973, Grand Junction, Colorado: Colorado State University, Fort Collins, p 80-89, 1973. 6 fig, 3 tab, 4 ref.

Descriptors: *Snowfall, *Snow removal, *Urban hydrology, Planning, Cities, *Canada, Mapping, Precipitation(Atmospheric).
Identifiers: *Vancouver(BC).

As part of an environmental impact study, the climate of the mountainous areas north and west of Vancouver, Canada were studied to assess possible climatic limitations to urban development of the mountain slopes. A model of mean annual precipitation based upon available data and meteorological theory is presented. A mean annual snowfall map is derived in part from relationships between mean annual snowfall and mean annual precipitation at various altitudes. Implications for urban planning are discussed. (Knapp-USGS)
W74-09612

TELEMETERED PROFILING ISOTOPIC SNOW GAUGE: FINAL REPORT AND SPECIFICATIONS,
Aerojet Nuclear Co., Idaho Falls, Idaho.
P. D. Randolph, R. A. Coates, and E. W. Killian.
Available from NTIS, Springfield, Va 22151 as ANCR-1105 (TID-4500) Price $7.60 printed copy; $1.45 microfiche. Aerojet Nuclear Company Report ANCR-1105, April 1973. 123 p, 29 fig, 7 tab, 8 ref, 11 append. AEC Contract AT(10-1)-1375.

Descriptors: *Precipitation gages, *Snowpacks, *Telemetry, *Nuclear moisture meters, Water equivalent, Snowmelt, Data collections, Hydrologic data, Instrumentation.

A telemetered snow gage can be used to measure snow depth, snow density at one-half inch depth intervals through a snow pack, total water content, changes in water content, amount of new snow since last measurement, rainfall amount, and snow melt rate between measurements. It operates by measuring the attenuation by snow of gamma rays traveling a fixed distance between two vertical tubes. Four such gages are operated as a telemetered network from a central base station in Idaho. The base station uses a small data processor for gage control and data analysis. The field units are in Alaska, Oregon, Idaho and Colorado. Performance requirements are given for gage parts as well as complete mechanical and electronic drawings. A base station user's manual, a software description and a complete software listing are also includes. (Knapp-USGS)
W74-09757

2D. Evaporation and Transpiration

WATER LOSS ESTIMATES FROM A FALLOW SOIL,
South Dakota State Univ., Brookings. Dept. of Plant Sciences.
L. R. Stone, T. C. Olson, and M. L. Horton.
Journal of Soil and Water Conservation, Vol 28, No 3, p 122-124, May-June, 1973. 3 fig, 1 tab, 12 ref.

Descriptors: *Soil water movement, Soil moisture, Soil water, Fallowing, *Evapotranspiration, Percolation, Infiltration, Soils, Root zone, Hydraulic conductivity.
Identifiers: Hydraulic potential.

The magnitude and direction of soil water movement were determined daily for 50 days using tensiometers placed at eight depths in a fallow soil. Flux at the 150-centimeter (60-in) depth was determined using hydraulic potential data, unsaturated hydraulic conductivities, and soil-characteristic values. Daily evaporation rates were calculated as the difference between total water depletion in the 0- to 150-centimeter profile and water flux at the 150-centimeter depth. Flux at the 150-centimeter depth was downward throughout most of the 50-day period. This technique offers a means of determining water loss due to evaporation and percolation below the root zone in fallow soils. (Martino-NWWA)
W74-09546

EVAPORATION LOSSES OF WINDBLOWN SNOW, AND THE POTENTIAL FOR RECOVERY,
Rocky Mountain Forest and Range Experiment Station, Laramie, Wyo.
R. D. Tabler.
Proceedings for sale by Western Snow Conference, R. T. Davis, Secretary, Rm. 360, U.S. Courthouse, Spokane, Wash. 99201. Price $3.00. In: Proceedings of the 41st Annual Meeting of the Western Snow Conference, April 17-19, 1973, Grand Junction, Colorado: Colorado State University, Fort Collins, p 75-79, 1973. 3 fig, 3 ref, append.

Descriptors: *Evaporation, *Snowpacks, *Colorado, *Sublimation, Snow, Winds, Snow management.

A method was developed to estimate annual sublimation from snowpacks. In low-growing sagebrush lands at 8,000 ft elevation along a highway study area, the average annual sublimation loss would be about 2,800 cu ft of water-equivalent per foot of width perpendicular to the wind, or about 224 ac-ft per sq mi--about 52% of the average winter's total precipitation. There can be little doubt that sublimation of blowing snow is a major component of the hydrologic cycle in such an area. Theoretically, all of the transport sublimation loss could be recovered if barriers were spaced sufficiently close to eliminate blowing snow completely. (Knapp-USGS)
W74-09611

ENERGY FLUX STUDIES IN A CONFIEROUS FOREST ECOSYSTEM,
Oregon State Univ., Corvallis. Dept. of Forest Engineering.
L. W. Gay.
Available from Sup Doc, GPO, Washington, DC 20402 Price $2.50. In: Proceedings of Conference on Research on Coniferous Forest Ecosystems, March 23-24, 1972, Bellingham, Wash: Forest Service Pacific Northwest Forest and Range Experiment Station, p 243-253, 1972. 3 fig, 1 tab, 21 ref. OWRR A-010-ORE(8).

Descriptors: *Forests, *Ecosystems, *Energy budget, Solar radiation, Evapotranspiration, Energy transfer, Convection, Albedo, Cloud cover.

The fluxes of thermal energy between the atmosphere and a young Douglas-fir forest were measured during two contrasting summer days, one cloudless and one overcast. The energy budget components were evaluated by the Bowen ratio method, with ceramic-wick psychrometers at the 26.16 m, 28.16 m, or 31.16 m levels. The maximum height of the tallest trees was 28 m, and the general level at the top of the closed canopy was about 22 m. Daily totals of the energy budget components (cal per sq cm) under cloudless skies on July 29, 1971, were: solar radiation, 584; net radiation, 410; change in storage, 5; convection, -135; and latent energy, -280. The albedo was 0.09 on both the clear and the overcast day. Analysis of the overcast conditions of July 31, 1971, yielded the following values: solar radiation, 171; net radiation, 134; change in storage, 6; convection, -39; and latent energy, -102. (Knapp-USGS)
W74-09615

2E. Streamflow and Runoff

HIGHWAYS AND THE CATASTROPHIC FLOODS OF 1972.
Highway Research Board, Washington, D.C.
Available from Highway Research Board, National Academy of Sciences, Washington, D.C. 20148, Price $2.20. Highway Research Record, No 479, 1973. 65 p.

Descriptors: *Floods, *Highways, *Design flood, *Disasters, Design, Risks, Conferences, Planning, Data collections, Flood data, Hydrologic data, Gaging stations, Damages.

Two conferences were devoted to the subject of the catastrophic floods that occurred in 1972 and the resulting impact on highway facilities. This material will be of interest to administrators, practicing engineers, and researchers interested in improving hydrologic analyses and hydraulic designs to minimize flood damage to transportation and other facilities. Not only did the record floods caused by Hurricane Agnes cause severe damage to highways in 1972, but numerous floods of significance occurred nationwide during the year. The papers presented discuss the hydrometeorological conditions associated with these floods and the part played by state and federal agencies in such emergencies. The comprehensive report on bridge damage due to Hurricane Agnes is included as a supplement to the proceedings. Debris was a primary cause or a significant contributing factor to bridge damage, and scour at the substructure was the other major cause. Other papers discuss recording, evaluating, and predicting extreme floods. A panel discussion on design criteria and the need for further research in such areas as improved methods of flood prediction and risk evaluation is included. (See W74-09391 thru W74-09400) (Knapp-USGS)
W74-09390

FLOODS OF 1972,
Geological Survey, Reston, Va.
D. M. Thomas.
Highway Research Record, No 479, p 1-4, 1973. 2 fig, 1 tab.

Descriptors: *Floods, *United States, Disasters, Historic floods, Flood data, Hurricanes, Storm runoff, Flood frequency, Dam failure, Seiches, Snowmelt, Weather, Meteorology.

During an average year floods in the U.S. claim about 100 lives and $1 billion in damage, but during 1972 the losses were four to five times that great. Although Hurricane Agnes caused severe fooding from North Carolina to New York, a variety of phenomena, including rainfall, snowmelt, ice jams, structural failures, and lake stages, caused flooding in Idaho, Washington, Oregon, Arizona, and other places. (See also W74-09390) (Knapp-USGS)
W74-09391

WEATHER SITUATIONS ASSOCIATED WITH FLOODS DURING 1972,
National Weather Service, Silver Spring, Md.
J. F. Miller.
Highway Research Record, No 479, p 5-11, 1973. 10 fig, 6 ref.

Descriptors: *Floods, *United States, Disasters, Historic floods, Flood data, Hurricanes, Storm runoff, Flood frequency, Dam failure, Seiches, Snowmelt, Weather, Meteorology, Weather.

Floods in the U.S. during 1972 resulted from a variety of meteorological causes, and some were only partially the result of extreme weather events. One flood that was not caused by a major weather event occurred on Buffalo Creek in West Virginia in February; and, although precipitation of moderate to heavy amounts occurred over a

fairly large area, the major flooding resulted primarily from dam failure. Of the other major flood events, one resulted from snowmelt during extremely warm periods, four resulted from isolated thunderstorm activity, three were the result of widespread precipitation associated with active frontal systems, one was the result of precipitation from a tropical storm, and one was the result of strong winds around the Great Lakes. (See also W74-09390) (Knapp-USGS)
W74-09392

HURRICANE AGNES-DAMAGE IN PENNSYLVANIA,
Pennsylvania State Dept. of Transportation, Harrisburg.
F. W. Bowser, and M. C. Tsai.
Highway Research Record, No 479, p 12-14, 1973.

Descriptors: *Floods, *Hurricanes, *Pennsylvania, *Damages, Historic floods, Highways, Bridges, Roads, Flood data.
Identifiers: *Hurricane Agnes(1972).

The Agnes flood levels of 1972 exceeded the previous record of 1936 by 3 to 6 ft in the Susquehanna River. At Wilkes-Barre, Pennsylvania, the river crested 18 ft above flood stage. The Schuylkill River in southeastern Pennsylvania crested at almost 17 ft above flood stage, which was 8 ft above the previous record set in 1902. In western Pennsylvania, the Allegheny, Monongahela, and Ohio Rivers crested at or near record levels. The overall damage from the June 1972 floods in Pennsylvania is estimated at more than $4 billion. Damage to roads, bridges, and other transportation facilities is estimated to exceed $100 million. (See also W74-09390) (Knapp-USGS)
W74-09393

FLOOD DAMAGE IN SOUTH DAKOTA,
South Dakota State Dept. of Highways, Pierre.
E. L. Rowen, and L. J. Harrison.
Highway Research Record, No 479, p 15-16, 1973. 1 tab.

Descriptors: *Historic floods, *Disasters, *South Dakota, Storm runoff, Cloudbursts, Damages, Bridges, Highways, Flood data.
Identifiers: Black Hills(SD).

South Dakota experienced its most devastating flood in history on June 9 and 10, 1972. This flood covered portions of Lawrence, Meade, Pennington, and Custer counties. The rain began at 5:00 p.m. on June 9 and continued until 2:00 a.m. on June 10 when it slowed to a drizzle that continued all day. Official reports on point rainfall accumulation show up to 14 in. covering about a 40-mile long by 15-mile wide area in the eastern Black Hills area. Two bridges were lost on the Interstate System, and emergency repairs were necessary on four others before traffic could be routed over them. Eighteen other bridges were completely destroyed on the state highway system. A total of 106 bridges were damaged or destroyed within the flood-ravaged area. (Knapp-USGS)
W74-09394

FLOODS IN MINNESOTA,
Minnesota State Highway Dept., Minneapolis.
J. E. Sandahl.
Highway Research Record, No 479, p 17-19, 1973. 2 tab.

Descriptors: *Floods, *Historic floods, *Minnesota, Damages, Highways, Bridges, Storm runoff, Flood data.

During the summer of 1972, Minnesota had rainfalls unprecedented in number, intensity, total rainfall, and area covered. The largest recorded storm in Minnesota history occurred on July 21, 1972, in central Minnesota. The storm was roughly 45 miles wide and 140 miles long, encompassing an area of 6,300 square miles. About 3,500 square miles or 55 persent of the storm area received a rainfall greater than 5 in. in the 8- to 10-hour storm duration; 178 square miles received more than 13 in. of rain. The storm caused the greatest monetary losses ever experienced in the state for a flash flood. Total damages are estimated at $20 million. Of this total, $5.9 million were damages to the road system. (See also W74-09390) (Knapp-USGS)
W74-09395

OBSERVATIONS ON THE CAUSES OF BRIDGE DAMAGE IN PENNSYLVANIA AND NEW YORK DUE TO HURRICANE AGNES,
Federal Highway Administration, Washington, D.C. Office of Engineering and Traffic Operations.
C. L. O'Donnell.
Highway Research Record, No 479, p 20-36, 1973. 24 fig, 3 ref.

Descriptors: *Floods, *Hurricanes, *New York, *Pennsylvania, *Bridges, Highways, Roads, Scour, Flood data, Bridge design, Historic floods.
Identifiers: Susquehanna River, Chemung River.

Hurricane Agnes (1972) caused severe flooding in Pennsylvania and New York. Several bridges and highways that were damaged by the floods in those states are discussed. The two major causes of bridge damage were scour at abutments and poers and impacting debris. Although the June 1972 flood was a maximum of record, many bridges survived the flood with little if any damage. These bridges were of particular interest because they obviously have features that enabled the structures to survive a severe test. The outstanding performance of these structures is a positive indication of features that constitute desirable design standards. A pile foundation of sufficient length or footings founded at a sufficient depth are needed to avoid abutment or pier failure in erodible soils. The amount of scour at bridge abutments and piers failure in erodible soils. The amount of scour at bridge abutments and piers within the bridge opening depended primarily on the amount of construction that the bridge opening imposed on the flood flow. Abutments and piers positioned near the edges of the main channel generally suffered extensive scour damage. The outstanding performance of spur dikes during the June 1972 floods clearly demonstrated that they are one of the most effective means now available for preventing scour damage to bridge approaches, abutments, and adjacent piers in situations involving large quantities of overbank flow. (See also W74-09390) (Knapp-USGS)
W74-09396

RECORDING FLOODS AND FLOOD DAMAGE,
Geological Survey, Reston Va.
For primary bibliographic entry see Field 4A.
W74-09397

PROBABILITY DISTRIBUTION OF EXTREME FLOODS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 4A.
W74-09398

THE WORTH OF DATA IN HYDROLOGIC DESIGN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-09399

DESIGN CRITERIA AND RESEARCH NEEDS,
Hydrologic Engineering Center, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-09400

FLOOD SURVEY AT PROPOSED TAPS CROSSING OF YUKON RIVER NEAR STEVENS VILLAGE, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 4C.
W74-09405

DISCHARGE COEFFICIENTS OF FLOAT-AREA-TYPE FLOW METERS,
Tokyo Science Univ. (Japan).
H. Maki.
Bulletin of the JSME (Japan Society of Mechanical Engineers), Vol 17, No 103, p 83-87, January, 1974. 6 fig, 1 tab, 8 ref.

Descriptors: *Flow measurement, *Instrumentation, *Reynolds number, *Mathematical studies, Flow rates, Application methods.
Identifiers: *Discharge coefficient.

The commonly used discharge coefficients of float-area-type flow meters do not always have constant values over a wide range of characteristic Reynolds numbers. Floats having special shapes or geometrical dimensions have constant value discharge coefficients. A semi-empirical formula to predict flow rate characteristics has been obtained and limits of applicability of this formula are explained. (Sandoski-FIRL)
W74-09480

CALIBRATION OF U.S. GEOLOGICAL SURVEY RAINFALL/RUNOFF MODEL FOR PEAK FLOW SYNTHESIS--NATURAL BASINS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2A.
W74-09603

A GENERAL PURPOSE EVENT WATER-LEVEL RECORDER,
National Water and Soil Conservation Organization, Wellington (New Zealand).
For primary bibliographic entry see Field 7B.
W74-09604

WATER--A PRIMER,
California Univ., Berkeley.
For primary bibliographic entry see Field 2A.
W74-09613

RIVER REGULATIONS AS INFLUENCE ON PEAK DISCHARGE,
International Engineering Co., Inc., Denver, Colo.
Barton, Stoddard, Milhollin and Higgins Div.
For primary bibliographic entry see Field 4A.
W74-09617

COMPARISON OF FOUR NUMERICAL METHODS FOR FLOOD ROUTING,
Hydraulics Research Station, Wallingford, (England).
R. K. Price.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY7, Paper 10659, p 879-899, July 1974. 4 fig, 2 tab, 18 ref, 7 append.

Descriptors: *Flood routing, *Numerical analysis, Routing, Flood waves, Waves(Water), Finite element analysis, Unsteady flow, Mathematical models.

The accuracy and efficiency of four of the more important numerical methods for flood routing were compared by simulating the propagation of the monoclinal wave in two channels with different bottom slopes. The implicit method of Amein is in general the most suitable method for routing floods in rivers of small slope. In addition, the implicit method has maximum accuracy when the ratio of the space and time steps is approxi-

mately equal to the flood wave speed. These conlusions are not necessarily valid for flooding in estuaries. The methods examined were Leap-Frog explicit method, two step Lax-Wendroff explicit method, four-point implicit method of Amein, and fixed mesh characteristic method. (Knapp-USGS)
W74-09621

DESKTOP COMPUTER FLOW ROUTING,
Geological Survey, Bay St. Louis, Miss.
For primary bibliographic entry see Field 8B.
W74-09626

MULTIPLE LINEARIZATION FLOW ROUTING MODEL,
Geological Survey, Bay St. Louis, Miss.
For primary bibliographic entry see Field 8B.
W74-09627

SIMULATION ACCURACIES OF GRADUALLY VARIED FLOW,
Montreal Engineering Co. Co. Ltd. (Quebec).
For primary bibliographic entry see Field 8B.
W74-09628

NEW DATA ON WATER CIRCULATION IN THE ARCTIC BASIN (NOVYYE DANNYYE O TSIRKULYATSII VOD ARKTICHESKOGO BASSEYNA),
Arkticheskii i Antarkticheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
A. F. Treshnikov, and G. I. Baranov.
Akademiya Nauk SSSR Doklady, Vol 207, No 3, p 702-705, 1972. 1 fig, 11 ref.

Descriptors: *Oceanography, *Ocean circulation, *Ocean currents, *Arctic, *Arctic Ocean, Winds, Eddies, Topography, Depth.
Identifiers: USSR, Hydrosphere, Countercurrents, Isobaths(Oceanography).

Circulation within the hydrosphere is one of the most important mechanisms of redistribution of heat transported to Earth and, in turn, released by Earth into space. Flow of water in the Arctic Basin is one of the links in total water circulation in the hydrosphere. Its importance, however, is not limited to this fact, since variations in circulation of surface waters of the Arctic Basin largely control variations in ice conditions in seas bordering the Arctic and, hence, navigation conditions on Arctic Sea routes. There is a close correlation of hydrologic fields over the entire depth of the ocean. Present investigations of water circulation in the Arctic Basin were based upon a theory of stationary thermohaline circulation as the internal form of movement in the ocean. All components of a geostrophic current were calculated in 1955-56 from known wind and water-density fields, and a diagram of deep circulation in the Arctic Basin was constructed. A developed region of anticyclonic circulation and a large transarctic current were observed in the surface layer. A two-layer circulation was observed in the Eurasian subbasin where bottom waters flow in a direction opposite to that of surface waters and Atlantic waters, and a three-layer circulation develops in the Canada Basin where surface and bottom waters form an anticyclonic circulation, and Atlantic waters form a cyclonic countercurrent. (Josefson-USGS)
W74-09649

TEMPERATURE AND SALINITY STATISTICS OF SURFACE WATERS OF THE ATLANTIC OCEAN (STATISTIKA TEMPERATURY I SOLENOSTI POVERKHNOSTI ATLANTIKI),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 2K.
W74-09650

USE OF BASE-RUNOFF RECESSION CURVES TO DETERMINE AREAL TRANSMISSIVITIES IN THE UPPER POTOMAC RIVER BASIN,
Geological Survey, Albuquerque, N. Mex.
F. W. Trainer, and F. A. Watkins, Jr.
Journal of Research, U.S. Geological Survey, Vol 2, No 1, p 123, 125-131, January-February, 1974. 2 fig, 1 tab, 17 ref.

Descriptors: *Potomac River, *Streamflow, *Data collections, *Transmissivity, *Recession curves, *Hydrogeology, Aquifer characteristics, Storage coefficient, Groundwater basins, Runoff.

The recession curve of base runoff is used in geohydrologic study of the upper Potomac River basin. The slope of the recession curve is used with other data to estimate average basin values for transmissivity from streamflow data. Two general recession curves characterize the tributary basins: (1) A continuous (simple) curve approximately straight on a semilogarithmic plot, which represents a constant set of diffusivity values within a basin and (2) a discontinuous (compound) curve, composed of a steeper first segment and a gentler second segment. Simple curves represent basins underlain by sandstone, shale, or crystalline rock; by combinations of these rocks; or by carbonate rock. Compound curves, which represent basins underlain in part by carbonate rock and in part by noncarbonate rock, are believed to reflect seasonal changes in relative discharge of these unlike aquifers, with the carbonate rock providing most of the ground-water runoff during summer-autumn and during drought. (Sandoski-FIRL=)
W74-09740

2F. Groundwater

THE PRODUCTION, FLOW AND DISTRIBUTION OF MELT WATER IN A GLACIER TREATED AS A POROUS MEDIUM,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 2C.
W74-09326

GLACIER DISCHARGE SIMULATION BY GROUND-WATER ANALOGUE,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 2C.
W74-09327

GROUND-WATER DATA, 1972, INDIAN WELLS VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
W74-09352

HYDROGEOLOGY OF THE FORMATION AND NEUTRALIZATION OF ACID WATERS DRAINING FROM UNDERGROUND COAL MINES OF WESTERN MARYLAND,
Geological Survey, Parkville, Md.
For primary bibliographic entry see Field 5B.
W74-09369

WATER-TABLE FLUCTUATION IN RESPONSE TO RECHARGE,
California Univ., Davis. Dept. of Water Science and Engineering.
M. A. Marino.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 100, No IR2, Paper 10582, p 117-125, June 1974. 2 fig, 10 ref, append.

Descriptors: *Recharge, *Water level fluctuations, *Water spreading, Groundwater, Equations, Irrigation, Water table, Surface-groundwater relationships.

Analytical expressions were developed to describe the rise and fall of the water table in an extensive unconfined aquifer receiving localized vertical recharge and discharging into a surface reservoir in which the water level remains equal to that of the main flow before recharge. The rate of recharge is maintained by a spreading area in the form of an infinitely long strip of finite width. The solutions are expressed in terms of the head averaged over the depth of saturation. They are applicable when the rise of the water table is smaller than 50% of the initial depth of saturation. A numerical example is presented. (Knapp-USGS)
W74-09409

A CENTRIFUGAL TECHNIQUE FOR RAPIDLY ESTIMATING THE PERMEABILITY OF A CONSOLIDATED SANDSTONE,
Birmingham Univ. (England). Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 8E.
W74-09527

VARIABLES AFFECTING WELL SUCCESS IN A KENTUCKY LIMESTONE AQUIFER,
Kentucky Univ., Lexington. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-09543

PROBLEMS RELATED TO THE EVALUATION OF GROUNDWATER RESOURCES OF THE CRYSTALLINE ROCK AREA, SAN DIEGO COUNTY, CALIFORNIA,
California State Univ., San Diego. Dept. of Geology.
W. J. Ganus.
In: Studies on the Geology and Geologic Hazards of the Greater San Diego Area, California, Ross, A. and Dowlen, R. J., eds., San Diego Association of Geologists, 1973. p 111-118.

Descriptors: *Crystalline rocks, Discharge, Recharge, Pump testing, Runoff, *California.

Methods of evaluating regional groundwater systems in crystalline rocks are discussed. Traditional methods of evaluation, based on rigid analytical models, that assume homogeneous and isotropic materials are ineffective in most crystalline terrains. More realistic evaluations can be obtained using methods based on projections of surface observations, water budget analysis, and pump test. A procedure for conducting pump tests in crystalline reservoirs is outlined and the results of several tests are discussed. Areas of recharge and discharge in a typical crystalline terrain are identified. Finally, the nature and extent of the storage and transmitting material is discussed, and a new model is presented to represent groundwater systems in fractured crystalline rocks. (Martino-NWWA)
W74-09544

GROUNDWATER POLLUTION.
For primary bibliographic entry see Field 5B.
W74-09590

THE EFFECT OF AN ARTIFICIAL LAKE DEVELOPMENT COMPLEX ON THE GROUNDWATER SYSTEM,
Wisconsin State Univ., Oshkosh. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W74-09591

POLLUTION STUDIES OF THE REGIONAL OGALLALA AQUIFER AT PORTALES, NEW MEXICO,
Eastern New Mexico Univ., Portales. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W74-09596

HYDRAULIC TESTING AND SAMPLING OF HOLES RB-E-01 AND RB-D-01, PROJECT RIO BLANCO, RIO BLANCO COUNTY, COLORADO,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 4B.
W74-09601

WATER--A PRIMER,
California Univ., Berkeley.
For primary bibliographic entry see Field 2A.
W74-09613

OPTIMAL PUMPING FOR AQUIFER DEWATERING,
Stanford Univ., Calif. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-09620

OUTLINE OF THE HYDROGEOLOGY OF SIBERIA (OCHERKI PO GIDROGEOLOGII SIBIRI).
Institut Zemnoi Kory, Irkutsk (USSR).
Komissiya po Izucheniyu Podzemnykh Vod Sibiri i Dal'nego Vostoka Materialy, No 6, Novosibirsk, 1973. 140 p.

Descriptors: *Investigations, *Hydrogeology, *Groundwater, *Groundwater resources, Groundwater basins, Groundwater movement, Aquifers, Water wells, Water supply, Water utilization, Water types, Mineral water, Brines, Lakes, Springs, Structural geology, Water chemistry, Inorganic compounds, Water quality, Mineralogy.
Identifiers: *USSR(Siberia), Soviet Far East, Mineralization, Spas, Balneology.

Water-bearing formations in different geologic and geocryologic conditions, and groundwater resources of fold mountain regions in East Siberia are described. Prospects of groundwater use for water supply of the Irkutsk Oblast are discussed, and attention is focused on problems relating to formation of different types of groundwater and mineral surface waters, their isotopic composition, and to hydrogeologic investigations in Siberia and Soviet Far East. (See W74-09642 thru W74-09647)
W74-09641

SUBSURFACE FLOW INTO LAKE BAYKAL BASIN (PODZEMNYY STOK BASSEYNA OZ. BAYKAL),
Institut Zemnoi Kory, Irkutsk (USSR).
For primary bibliographic entry see Field 2H.
W74-09642

PRESENT STATE AND PROSPECTS OF GROUNDWATER USE FOR WATER SUPPLY OF POPULATED AREAS IN IRKUTSK OBLAST (SOSTOYANIYE I PERSPEKITIVY ISPOL'ZOVANIYA PODZEMNYKH VOD DLYA VODOSNABZHENIYA OBZHITOY CHASTI IRKUTSKOY OBLASTI),
Institut Zemnoi Kory, Irkutsk (USSR).
For primary bibliographic entry see Field 4B.
W74-09643

PROBLEMS OF HYDROGEOLOGIC INVESTIGATIONS IN THE EASTERN PART OF THE USSR IN 1971-75 (ZADACHI GIDROGEOLOGICHESKIKH ISSLEDOVANIY NA VOSTOKE SSSR NA 1971-1975 GG),
Institut Zemnoi Kory, Irkutsk (USSR).
For primary bibliographic entry see Field 4B.
W74-09647

2G. Water In Soils

ECOLOGICAL INVESTIGATION OF EUBACTERIA AND ACTINOMYCETES IN AQUATIC AND TERRESTRIAL BIOTOPES OF CROATIA (IN SERBO-CROATIAN),
Institut za Botaniku, Zagreb (Yugoslavia).
For primary bibliographic entry see Field 5B.
W74-09351

CALCULATION OF NATURAL CATCHMENT INFILTRATION BY COMPUTER,
National Water and Soil Conservation Organization, Wellington (New Zealand).
For primary bibliographic entry see Field 7C.
W74-09367

WASTEWATER AND SOIL INTERACTION,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 5D.
W74-09425

SOIL CLOGGING DURING INFILTRATION OF SECONDARY EFFLUENT,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5D.
W74-09467

DISTRIBUTION OF MOISTURE IN THE UNSATURATED SOIL PROFILE ON A PIEDMONT WATERSHED,
Clemson Univ. Clemson, S.C. Dept. of Agricultural Engineering.
J. T. Ligon, and T. V. Wilson.
Transactions of the ASAE (American Society of Agricultural Engineering), Vol 16, No 6, p 1100-1103, November-December, 1973. 15 fig, 6 ref. OWRR A-023-SC(5).

Descriptors: *Soil profiles, *Moisture content, *Watersheds(Basins), Soil moisture, Surface runoff, Precipitation(Atmospheric), Subsurface runoff, Seepage, Root zones, Groundwater, *South Carolina, *Soil moisture.
Identifiers: *Clemson Research Watershed(SC).

The distribution of moisture was investigated in the unsaturated soil profile of a 0.21 acre plot within a 28.4 acre watershed of the 561 acre Clemson Research Watershed in the Piedmont area. Intensive measurements were made of soil moisture to a depth of 32 ft along with measurement of precipitation, surface runoff and interflow to provide some indications of the nature of the deep seepage groundwater recharge phenomenon in this region. It is apparent that downward seepage below the zone of root influence is a continuous process but that the rate of transfer at a point increases rapidly with increased moisture content. At this particular site, where the water table occurs at a depth of 60-65 ft, there is a considerable lag between the occurrence of excess moisture at hthe soil surface and groundwater recharge resulting from this excess. The extent of this time lag is a function of initial soil moisture due to the strong dependence of unsaturated conductivity upon moisture content. (Merritt-FIRL)
W74-09518

WATER LOSS ESTIMATES FROM A FALLOW SOIL,
South Dakota State Univ., Brookings. Dept. of Plant Sciences.
For primary bibliographic entry see Field 2D.
W74-09546

CALCULATION OF SOIL HYDRAULIC CONDUCTIVITY FROM SOIL-WATER RETENTION RELATIONSHIPS,
Battelle-Pacific Northwest Lab., Richland, Wash. Dept. of Water and Land Resources.
A. E. Reisenauer.
Available from NTIS, Springfield, Va. 22151 as BNWL-1710 - Price $4.00 printed copy; $1.45 microfiche. Report BNWL-1710, 1973. 27 p, 13 fig, 1 tab, 14 ref, 2 append. AEC Contract AT(45-1)-2130.

Descriptors: *Computer programs, *Hydraulic conductivity, *Soil water movement, Soil moisture, Equations, Retention, Moisture tension.
Identifiers: *Millington and Quirk equation, Moisture suction.

To compute hydraulic conductivity of partially saturated soil, a computer program was written to solve the modified Millington and Quirk equation. The equation uses moisture retention and suction measurements. The equation and computer programs are discussed. Plots of test results are compared with physically measured data. (Knapp-USGS)
W74-09599

CLOUD SEEDING FOR SNOW AUGMENTATION: LAND USE RAMIFICATIONS OF RESIDUAL SILVER IODIDE NUCLEATING AGENTS,
Colorado State Univ., Fort Collins. Dept. of Microbiology.
For primary bibliographic entry see Field 5B.
W74-09606

THE UNIQUENESS OF THE MOISTURE CHARACTERISTICS,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
A. Poulovassilis.
Journal of Soil Science, Vol 25, No 1, p 27-33, March 1974. 3 fig, 10 ref.

Descriptors: *Soil water movement, *Wetting, *Unsteady flow, Moisture Content, Moisture tension, Hysteresis, Unsaturated flow, Saturated flow.

The relationship between moisture content and suction in porous materials during transient flow conditions was tested. When a vertical column of sand was brought to uniform moisture content and uniform suction in a draining condition by percolating a constant flow through it until apparent equilibrium conditions ensued and then placed horizontally at the same time as the flow was stopped, the suction decreased with time over a period of a day, indicating that the sand was wetting. This decrease was smaller, the drier the sand. However, when the column was left in a vertical position with the water percolating through it for three hours after apparent equilibrium conditions were reached, a small adjustment of moisture content and suction was observed; when it was then placed horizontally as in the previous experiments, little decrease of suction was observed. No change in suction was observed in either case if the equilibrium condition was reached in a wetting porous material. These experimental results are explained by the hypothesis that, during drainage, some water is left in pores from which the air-water interface has already retreated to drain through film flow, more slowly, subsequently to the continuous water body. Additional experiments showed that the release of entrapped air may have a small effect on the uniqueness of the moisture characteristics. (Knapp-USGS)
W74-09625

STORAGE OF MANURE SOLIDS BY FORMING SOIL-MANURE PELLETS,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 5D.

W74-09679

CONTRIBUTION OF ANIMAL WASTE TO NITRATE NITROGEN IN SOIL,
Pennsylvania State Univ., University Park.
For primary bibliographic entry see Field 5B.
W74-09697

HEAVY MANURE APPLICATIONS: BENEFIT OR WASTE,
Massachusetts Univ., Amherst. Dept. of Plant and Soil Sciences.
For primary bibliographic entry see Field 5D.
W74-09698

EFFECTS OF SOLID BEEF FEEDLOT WASTES ON SOIL CONDITIONS AND PLANT GROWTH,
Kansas State Univ., Manhattan.
For primary bibliographic entry see Field 5D.
W74-09699

DRAINAGE INVESTIGATIONS AND FINDINGS ON THE GOTVAND PROJECT - IRAN,
Harza Engineering Co., Chicago, Ill.
P. Jacobsen.
Paper No 72-703 presented at Winter Meeting of the American Society of Agriculture Engineers, December 11-15, 1972. Chicago, Illinois. 7 p, 3 fig, 2 tab, 3 ref.

Descriptors: *Draina164*Surface drainage, *Subsurface drainage, Tile drainage, Soil water, Salinity, Water table.
Identifiers: *Iran.

In the spring of 1972 a special drainage investigation, which included soil analyses and permeability studies, was made on the Gotvand Project in Iran. As a result, drainage recommendations were made for specific areas and a monitoring system was proposed that would indicate the need for additional drainage before land damage can occur. (Skogerboe-ColoradoState)
W74-09797

2H. Lakes

REPORT ON GREAT LAKES WATER QUALITY FOR 1972.
International Joint Commission-United States and Canada.
For primary bibliographic entry see Field 5G.
W74-09257

IMPERMANENT LAKES,
D. Brunsden, and J. C. Doornkamp.
Geographical Magazine, Vol 44, p 393-397, (1973). 6 fig.

Descriptors: *Lake(Inflow), *Discharge(Water), *Bodies of water, *Morphology, Sediments, Glaciers, Lake basins, Lake stages, Artificial lakes, VEOLUME(Sediment-water interfaces, Watersheds, Catchment basin, Evaporation, Water law, Lake shores.
Identifiers: *Tectonic lakes.

The impermanence of lakes is examined. Lakes, regarded as constantly changing natural systems, may be manmade or natural systems; they are generally formed under special but varied conditions such as glacial erosion, downwarping of the earth's crust, and the presence of barriers across river valleys. Rain and groundwater are collected onto the water surface itself or onto the lakes' catchment areas. The catchments supply sediment to the lake which, if it does not possess a vigorous outlet, may be rapidly infilled by course deltaic deposits near the incoming stream mouths, or silts and clays in deeper water or near the lake exit. If very little sediment leaves the storage basin it is possible to estimate the volume of silt on a lake floor and thereby obtain a measure of the rate of erosion of the catchment area. Some lakes may change prmanently when the primary cause for their presence disappears, such as retreating glaciers, out-flowing rivers cutting below the level of the lowest point in the lake basin, or the filling of the lakes with sediments. Lakes can also be drained by man, or tectonic tilting. The importance of lakes in the more recent history of the earth's surface is discussed. (Proctor-Florida)
W74-09261

SUBGLACIAL LEAKAGE OF SUMMIT LAKE, BRITISH COLUMBIA, BY DYE DETERMINATIONS,
Department of the Environment, Ottawa (Ontario). Inland Water Branch.
For primary bibliographic entry see Field 2C.
W74-09332

STRUCTURE AND INFERRED CIRCULATION OF SOUTH CASCADE LAKE, WASHINGTON, U.S.A.,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 2C.
W74-09349

INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES.
Available from NTIS, Springfield, Va 22151 as Com-73-10913, Price $3.00 printed copy; $1.45 microfiche. International Field Year for the Great Lakes Bulletin No 3, May 1972. 86 p.

Descriptors: *Great Lakes, *Limnology, *Data collections, *United States, *Canada, Data processing, Hydrology, Water chemistry, Fisheries, Instrumentation.
Identifiers: *International Field Year for the Great Lakes.

Status and results of both the U.S. and Canadian programs in the International Field Year for the Great Lakes are reviewed in relation to the Joint (U.S.:Canadian) Technical Plan. Aspects reviewed are: instruments and observing systems, data management, taxonomy of plankton, fishery survey, buoy system measurements, and water chemistry. (Knapp-USGS)
W74-09350

INTERNATIONAL FIELD WORK FOR THE GREAT LAKES.
Available from NTIS, Springfield, Va. 22151, as COM-73-11097, Price $5.75 printed copy; $1.45 microfiche. International Field Year for the Great Lakes, Bulletin No 6, April 1973. 67 p, J. Sandilands, F. Jenkins and M. Laughrum, editors.

Descriptors: *Lake Ontario, *International Hydrological Decade, *Great Lakes, Limnology, Plankton, Meteorology, Waves(Water), Data collections.
Identifiers: *International Field Year for the Great Lakes.

Canadian IFYGL work on Lake Ontario includes studies of zooplankton, phytoplankton biomass and species composition, wind and temperature fluctuations, meteorological buoy measurements, and wave climatology of the lake. Information is also given on the U.S. scientific programs of data acquisitions systems and data management. References to recent papers and reports of interest to participants are included. (Knapp-USGS)
W74-09372

LAKE ONTARIO HYDRAULIC MODEL STUDY (PRELIMINARY RESULTS),
State Univ. of New York, Buffalo. Dept. of Civil Engineering.
R. R. Rumer, Jr., K. Kiser, and C. Y. Li.
Available from NTIS, Springfield, Va. 22151 as COM-73-10724 Price $3.00 printed copy; 0.95 microfiche. NOAA Sea Grant 2-35281.

Descriptors: *Model studies, *Water circulation, *Lake Ontario, Seiches, Winds, Currents(Water), *Hydraulic models, Hydraulic similitude, Great Lakes.

The response of Lake Ontario to wind stress at the free surface, thermal stratification, and the major inflow and outflow was studied using a physical model. The model is rotated to incorporate the Coriolis force. The experiments include a study of seiche damping in the model of Lake Ontario, a study of the circulation pattern resulting from the inflow of the Niagara River and the outflow of the St. Lawrence River, and a study of the circulation resulting from a superposed, steady westerly wind. The electrolytic technique for generating a neutrally buoyant colored tracer is the primary technique. For seiche decay, boundary friction in the model is reasonably simulated for the main basin but exaggerated in the shallow entrance region to the St. Lawrence River. The observed period and frictional dissipation of the uninodal seiche were strongly influenced by this shallow region north of Main Duck Island. The electrolytic technique for observing water movement is highly satisfactory. (Knapp-USGS)
W74-09402

ENVIRONMENTAL STATUS OF THE LAKE MICHIGAN REGION: VOLUME 7. EARTHQUAKE HISTORY AND MEASUREMENT WITH APPLICATION TO THE LAKE MICHIGAN DRAINAGE BASIN,
Argonne National Lab., Ill.
R. B. Keener.
Available from NTIS, Springfield, Va. 22151 as ANL/ES-40, Vol. 7, Price $4.00 printed copy; $1.45 microfiche. Report ANL/ES-40, Vol 7, February 1974. 19 p, 2 fig, 2 tab, 22 ref. AEC Contract W-31-109-ENG-38.

Descriptors: *Earthquakes, *Risks, *Great Lakes Region, *Lake Michigan, Engineering geology, Seismic design, Seismology.

Seismicity of the Lake Michigan Basin is described, covering earthquakes with a maximum felt intensity as small as II. Earthquakes which have taken place outside of the Basin but were felt within it are tabulated also. Major earthquake risk areas of the United States are discussed, and a brief inventory of a few of the major earthquakes that occurred or have otherwise been felt in the country is given. The methods of measuring and categorizing seismic events are reviewed. A short section regarding theories of earthquake prediction is included. (Knapp-USGS)
W74-09407

BENTHOPHILUS STELLATUS (SAUVAGE) IN THE KUIBYSHEV RESERVOIR (IN RUSSIAN),
F. K. Gavlena.
Vopr Ikhtiol, Vol 13, No 1, p 174-175, 1973.
Identifiers: *Benthophilus-stellatus, Reservoirs, *USSR(Kuibyshev reservoir), Aquatic animals.

B. stellatus, a member of the Black Sea-Caspian faunal complex that adapted to freshwater life in the Upper Tertiary, has become a new element of the fish fauna of the Kuibyshev reservoir and Volga basin (USSR).--Copyright 1974, Biological Abstracts, Inc.
W74-09433

PHOSPHORUS STUDIES IN LOWER GREEN BAY, LAKE MICHIGAN,
Wisconsin Univ., Madison. Dept. of Water Chemistry.
For primary bibliographic entry see Field 5C.
W74-09435

FULL-SCALE HARVEST OF AQUATIC PLANTS: NUTRIENT REMOVAL FROM A EUTROPHIC LAKE,
North Dakota Univ., Grand Forks. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W74-09438

CONTENT AND COMPOSITION OF PLANT PIGMENTS IN THE RYBINSK RESERVOIR (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
V. A. Elizarova.
Gidrobiol Zh, Vol 9, No 2, p 23-33, 1973, Illus, English summary.
Identifiers: Carotenoids, *Chlorophyll, *Phytoplankton, *Pigments(Plants), Reservoirs, *USSR(Rybinsk reservoir).

Three peaks in the plant pigments concentration in the waters of Rybinskoya (USSR) reservoir are noted (June, Aug., Sept.), that coincide with the periods of the most intense phytoplankton development. Vertical distribution of pigments in the spring and autumn is rather even; a summer peak in chlorophyll a concentration within upper 2 m water layer, and chlorophyll c in the bottom layer is noted. Average chlorophyll content for the study period was in limits 3.5 to 9 for chlorophyll a, 0.4 to 1.0 for chlorophyll b, 1.4 to 2 mcg/l for chlorophyll c, and 3.7 to 7.0 mSPU/l for carotenoids. The correlation carotenoids/chlorophyll a was calculated. This value changes during the vegetation period, and depends on the phytoplankton composition and its physiological state.--Copyright 1974, Biological Abstracts, Inc.
W74-09446

PHILOMETRA LUSIANA FROM FISHES OF THE KREMENCHUG RESERVOIR, USSR, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kiev (USSR).
V. P. Bachinski, and N. F. Gomonenko.
Parazitologiya, Vol 7, No 3, p 293-294, 1973, English summary.
Identifiers: *Philometra-lusiana, Reservoirs, *USSR(Kremenchug reservoir), *Fish parasites.

P. lusiana which was previously known only from pond fisheries, was recorded from fishes of natural waters. An increase in the infection rate of fishes with P. lusiana in the Kremenchug reservoir shows that conditions prevailing in natural waters are favorable for the completion of the life cycle of this parasite.--Copyright 1974, Biological Abstracts, Inc.
W74-09449

FORMATION OF THE BENTHOS OF THE RUZ RESERVOIR IN THE FIRST YEARS OF ITS EXISTENCE (1966-1967), (IN RUSSIAN),
E. V. Pastukhova.
Biol Vnutr Vod Inf Byull. 15. p 25-29. 1972.
Identifiers: *Benthos formation, *Chironomus-plumosus, Reservoirs, *USSR(Ruz river reservoir).

A river-bed type reservoir with a length of 35 km, width 1 km, area 33 km3, and average depth 7 m was created on the Ruz river (tributary of the Moscow river (USSR)) in 1965. Data on the formation of the benthos in the river bed and submerged floodplain of the river are presented on the basis of regular observations at 33 stations during the ice-free period of 1966-1967. The ususal successive impoverishment of the species composition of the benthos in reservoirs after mass reproduction of chironomids, mainly Chironomus plumosus, was noted; and in the 2nd year there was a decline of the population and biomass of the benthos.--Copyright 1974, Biological Abstracts, Inc.
W74-09507

ON THE CHARACTERIZATION OF THE PARASITE FAUNA OF YELLOW PERCH (PERCA FLUVIATILIS L.) IN FIVE LAKES, IN SOUTHERN ONTARIO, CANADA,
Waterloo Univ. (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 5B.
W74-09541

GREAT LAKES ICE COVER, WINTER 1971-72,
National Ocean Survey, Detroit, Mich.
For primary bibliographic entry see Field 2C.
W74-09588

SUBSURFACE FLOW INTO LAKE BAYKAL BASIN (PODZEMNYY STOK BASSEYNA OZ. BAYKAL),
Institut Zemnoi Kory, Irkutsk (USSR).
B. I. Pisarskiy.
In: Ocherki po gidrogeologii Sibiri; Komissiya po Izucheniyu Podzemnykh Vod Sibiri i Dal'nego Vostoka Materialy, No 6, p 43-52, Novosibirsk, 1973. 7 tab.

Descriptors: *Lakes, *Lake basins, *Subsurface flow, *Groundwater movement, *Surface-groundwater relationships, Streamflow, Discharge(Water), Springs, Water types, Rivers, Underflow, Groundwater resources, Fractures(Geologic), Rocks.
Identifiers: *USSR(Lake Baykal), Tectonics.

Subsurface flow into Lake Baykal consists of (1) groundwater contribution to streamflow; (2) underchannel flow; and (3) deep inflow of cold and thermal waters along fracture zones. Groundwater contribution to streamflow is the major part of the natural groundwater resources and is 18,210 million cu m/yr or 1.1 liters/sec/sq km. The role of underchannel flow and of flow through fracture zones is negligible. The rate of underflow is estimated at 1,030 million cu m/yr. Deep flow through fracture zones in the area of the lake cannot be directly measured. Excess of outflow from the basin over inflow is 2,680 million cu m/yr. On the basis of calculations, total natural groundwater resources in Lake Baykal basin are estimated at 20,890 million cu m/yr, and the average rate of subsurface flow is 1.26 liters/sec/sq/km. (See also W74-09641) (Josefson-USGS)
W74-09642

MINERAL LAKES OF TUVA (MINERAL'NYYE OZERA TUVY),
Institut Zemnoi Kory, Irkutsk (USSR).
A. I. Krutikova, and Yu. I. Kustov.
In: Ocherki po gidrogeologii Sibiri; Komissiya po Izucheniyu Podzemnykh Vod Sibiri i Dal'nego Vostoka Materialy, No 6, p 113-117, Novosibirsk, 1973. 1 fig, 2 tab.

Descriptors: *Water chemistry, *Water quality, *Lakes, *Mineral water, Salts, Carbonates, Sulfates, Brines, Water temperature, Trace elements, Lake morphometry.
Identifiers: *USSR(Tuva ASSR), Mineral springs, Balneology, Mineralization.

The Tuva Autonomous Republic has many mineral lakes of varying composition and mineralization. Water-surface areas of the lakes are generally small (0.5-5.0 sq km) except for Lake Khadyn (23.6 sq km) and Lake Ubsu-Nur (3,350 sq km), which borders on the Mongolian People's Republic. Depth of the lakes varies between 0.3 and 3.4 m, occasionally reaching 10 m or more (Lake Khadyn). The thickness of mud deposits is 0.3-1.0 m and, in places, 1.5 m. The dissolved-salts content in the lakes varies between 2 and 340 g/liters and the water temperature, between 15 and 28 deg C. Distribution of 11 mineral lakes in central Tuva is mapped, and chemical composition of 6 mineral lakes and trace-element composition of 10 mineral lakes are tabulated. Use of natural brine of the lakes is recommended for balneological and industrial purposes. (See also W74-09641) (Josefson-USGS)
W74-09646

URBAN PUBLIC POLICY AND POLITICAL INSTITUTIONS FOR WATER QUALITY MANAGEMENT ON LAKE ERIE: YEAR TWO,
Battelle Columbus Lab., Ohio.
For primary bibliographic entry see Field 5G.
W74-09653

LIMNOLOGICAL STUDIES OF LAKE JACOMO, JACKSON COUNTY, MISSOURI. II. THE DYNAMICS OF THE MACROBENTHOS AND ITS RELATIONSHIP TO WATER QUALITY AND PLANKTON DISTRIBUTION IN LAKES JACOMO AND PRAIRIE LEE, WITH A NOTE ON THE SPORT FISHERY, 1971-1972,
Missouri Univ., Kansas City. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-09660

SURFACE SEDIMENTS IN HAMANA LAKE, THE PACIFIC COAST OF CENTRAL JAPAN,
Shizuoka Univ. (Japan). Faculty of Science.
I. Noriyuki, and T. Handa.
Rep Fac Sci Shizuoka Univ. 7 p 129-148, 1972, Illus.
Identifiers: Coast, Composition, *Japan(Hamana Lake), Lakes, Pacific Ocean, Sediments, *Zostera-Marina, *Lake sediments.

A grain-size analysis was made on the surface sediments of Hamana Lake, Japan with sieving and pipette methods. The sediments were divided into 3 major types. Distributions of Phi-Median, Sigma-Phi and Alpha-Phi are calculated from the cumulative curves and discussed in relation to the hydraulic condition of the lake. Sand which is distributed in the southern part of the lake is probably supplied by the tide currents from the open sea. Silt which occupies northern half of the lake originates from the suspension mainly supplied by terrestrial water. Sediments sustaining Zostera marina are characterized by the well sorted sand with approximately 30% mud content in 3-4 m water. Z. nana is found in low salinity areas with sediments of gravel-bearing sand and silt.--Copyright 1973, Biological Abstracts, Inc.
W74-09751

AN INFORMATION SYSTEM FOR THE MANAGEMENT OF LAKE ONTARIO,
Cornell Univ., Ithaca, N.Y.
H. D. Reynolds.
Available from NTIS, Springfield, Va, 22151 as COM-73-11249, Price $5.50 printed copy, $1.45 microfiche. New York State Sea Grant Program, Great Lakes Management Problems Series, May 1973, 190 p, 7 fig, 9 tab, 77 ref.

Descriptors: *Information exchange, *Lake Ontario, *Information retrieval, Data storage and retrieval, Water management(Applied), International Joint Commission, Planning, Data collections, Great Lakes, Canada, United States.

An information system is proposed for the management of Lake Ontario. It should be effectively and efficiently responsive to the needs of the users, considering the purposes to be served and the types and amounts of information required to serve these purposes. The study provides a logical procedure for identifying information users, needs, sources, and implications for the nature of the information system and provides a basis for case studies. The case studies illustrate this procedure in a detailed manner. The information system being considered will not only serve the Experimental Operations Office in carrying out its management and planning tasks, it will also serve as a means to carry out the much needed task of providing coordination of information collection, storage, and dissemination among all parties in Canada and the United States concerned with water resources. (Knapp-USGS)
W74-09752

LEAD, CD, ZN, CU, AND CO IN STREAMS AND LAKE WATERS OF CAYUGA LAKE BASIN, NEW YORK.
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-09762

PARTICULATE LEAD CONTAMINATION RECORDED IN SEDIMENTARY CORES FROM LAKE WASHINGTON, SEATTLE,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W74-09791

2I. Water In Plants

VASCULAR PLANT SURVEY OF MARSH AND ADJACENT HIGHLAND IN SELECTED PORTIONS OF COOPER RIVER AND WANDO RIVER,
South Carolina Univ., Columbia.
For primary bibliographic entry see Field 2L.
W74-09382

THE VEGETATION OF THE COOPER RIVER ESTUARY,
South Carolina Univ., Columbia.
For primary bibliographic entry see Field 2L.
W74-09383

EFFICIENCY OF FUNCTIONING OF THE MAIN ECOSYSTEMS OF THE EUROPEAN FOREST-STEPPE, (IN RUSSIAN),
A. M. Grin, Yu. L. Rauner, and V. D. Utekhin.
Dokl Inst Geogr Sib Dal'Nego Vostoka. 33. p 45-50. 1972.
Identifiers: *Ecosystems, *Europe(Forest-steppe), Moisture, *Productivity, Solar radiation, *Biota, USSR(Kursch).

The biological productivity of ecosystems depends on the efficiency of utilizing the material and energy resources of the environment (solar radiation, moisture, etc.) by the biota. The efficiency is determined by the internal structure of the biota. It is suggested to distinguish 2 aspects of the structure: edification and adaptive. The edification structure determines the uptake of the environmental resources by the ecosystem and the adaptive structure determines the completeness of their utilization by the biota. Indexes are presented of the utilization of radiation and moisture in the main ecosystems of the forest-steppe in the region of Kursch (USSR) forest, steppe and agricultural (field). The edification and adaptive structures of the plant part of the biota (phytobiota) in these associations are described and the significance of the characteristics of the structure for efficient operation of the ecosystem is considered.--Copyright (c) 1974, Biological Abstracts, Inc.
W74-09500

STUDIES ON TREMATODE PARASITES OF LUCKOW (INDIA): I,
Lucknow Univ. (India). Dept. of Zoology.
K. C. Pandey.
Indian J Zootomy, Vol 11 No 3, p 145-148. Illus. 1970(1972).
Identifiers: *India(Lucknow), New, Orientocreadium-bactrachoides, Phyllodistomum-vachius, *Tetracotyle-lali, *Trematodes, *Fish parasites, New species.

A new stregeid metacercaria, Tetracotyle lali is described. Variations in Orientocreadium batrachoides Tubangui, 1931 and Phyllodistomum vachius Dayal, 1949 are discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-09530

GROWTH OF SUBIRRIGATED JAPANESE HOLLY AS AFFECTED BY SOIL TYPE AND DEPTH,
Georgia Univ., Athens. Dept. of Horticulture.
S. I. Patel, and J. H. Tinga.
Hortscience, Vol 8, No 1, p 27-28, 1973, Illus.
Identifiers: Cultivars, *Growth rates, Ilex-crenata, *Japanese holly, Rotundifolia, Soil types, *Irrigation.

Container-grown plants of Japanese holly (Ilex crenata Thumb. cv. 'Rotundifolia') were grown satisfactorily using subirrigation for 90 days during July-Sept. With either sandy loam or clay loam soil at a depth of 20 or 30 cm on a constant water level pan, soil moisture level remains near optimum in the root zone.--Copyright 1973, Biological Abstracts, Inc.
W74-09600

ENERGY FLUX STUDIES IN A CONFIEROUS FOREST ECOSYSTEM,
Oregon State Univ., Corvallis. Dept. of Forest Engineering.
For primary bibliographic entry see Field 2D.
W74-09615

AN INITIAL EVALUATION OF ETHYLENE OXIDE FOR THE STERILIZATION OF FORMULATED AND PELLETED FISH FEEDS,
Victoria Univ. (British Columbia). Dept. of Bacteriology and Biochemistry.
T. J. Trust, and A. J. Wood.
J Fish Res Board Can. Vol 30, No 2, p 269-274, 1973.
Identifiers: *Bacterial studies, Ethylene oxide, *Fish food, Growth rate, Infection, Salmo-gairdneri, Sterilization, *Juvenile fish, *Trout.

Satisfactory sterilization (to deter bacterial infection) of dried pelleted fish foods was achieved with an ethylene oxide-carbon dioxide gas mixture (20:80). The growth rates of juvenile rainbow trout (Salmo gairdneri) fed on feed so sterilized were comparable to or better than those of trout fed the same feed not sterilized.--Copyright 1973, Biological Abstracts, Inc.
W74-09723

MUSSELS OF THE ELK RIVER BASIN IN ALABAMA AND TENNESSEE: 1965-1967,
Tennesse Valley Authority, Muscle Shoals, Ala. Environmental Biology Branch.
B. G. Isom, P. Yokley, Jr., and C. H. Gooch.
Am Midland Nat., Vol 89, No 2, p 437-442. 1973.
Identifiers: *Alabama, Dysnomia-biemarginata, *Elk River(Ala-Tenn), Fusconaia-cuneolus, Fusconaia-edgariana, Lastena-lata, Lexingtonia-dolabelloides, *Mussles, Quadrula-intermedia, *Tennessee, River basins.

Extensive collections of mussels were made in the Elk River basin during 1965-1967. Thirty species of mussels not previously reported for this drainage were collected in addition to 18 spp. reported by Ortmann (1925). Twenty-six Cumberlandian and 35 spp. of Ohioan or unknown origin comprise the total mussel fauna reported for Elk River. Species of Cumberlandian origin reported by Ortmann have declined and species usually associated with larger rivers have increased. Tims Ford Dam (closed Dec. 1970) will, undoubtedly, significantly affect the mussel fauna of Elk River. Endangered mussel species in the portion of the Elk River covered by this study include Fusconaia cuneolus, F. edgariana, Quadrula intermedia, Lexingtonia dolabelloides, Lastena lata and Dysnomia biemarginata.--Copyright 1973, Biological Abstracts, Inc.
W74-09737

DYNAMICS OF FOREST, MEADOW AND SWAMP VEGETATION IN CONNECTION WITH RECLAMATION (BASED ON STUDIES IN BELORUSSIA), (IN BYELORUSSIAN),
I. D. Yurkyevich, L. P. Smolyak, and V. I. Parfyunaw.
Vyestsi Akad Navuk B Ssr Syer Biyal Navuk. 5. p 5-10, 1972.
Identifiers: Forests, Meadows, *Plant communities, *Productivity, Reclamation, Succession, Swamps, *USSR(Byelorussia), *Vegetation.

Results of a study of the succession of plant communities as a function of the degree and duration of reclamation and its effect on productivity are presented.--Copyright 1973, Biological Abstracts, Inc.
W74-09746

DYNAMICS OF THE VEGETATION OF THE SANDS OF THE ANCIENT AND PRESENT DELTA OF THE SYR-DAR'YA RIVER,
F. N. Chalidze.
Ekologia. Vol 3, No 6, p 48-51, 1972.
Identifiers: *Deltas, Moisture, Rivers, Sands, *USSR(Syo-Darya delta), *Vegetation.

The series of plant communities of the sands of the Syr-Dar'ya delta are described in relation to variations of the groundwater level, development of the alluvial process, and moisture conditions and formation of deposits of different mechanical composition related with them. The possibility of indicating individual phases of these changes on the basis of the vegetational cover is shown.--Copyright 1973, Biological Abstracts, Inc.
W74-09750

2J. Erosion and Sedimentation

GLACIAL ORIGIN OF PRO-GLACIAL BOULDERS,
Newcastle-upon-Tyne Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 2C.
W74-09336

WATER AT THE BED OF A GLACIER,
Bristol Univ. (England). H. W. Wills Physics Lab.
For primary bibliographic entry see Field 2C.
W74-09340

TIDAL CURRENTS, SEDIMENT TRANSPORT, AND SAND BANKS IN CHESAPEAKE BAY ENTRANCE, VIRGINIA,
Old Dominion Univ., Norfolk, Va. Inst. of Oceanography.
For primary bibliographic entry see Field 2L.
W74-09368

CHARLESTON AREA SEDIMENT SAMPLES,
South Carolina Pollution Control Authority, Columbia.
For primary bibliographic entry see Field 5A.
W74-09386

SEISMIC PROFILES, COOPER RIVER.
For primary bibliographic entry see Field 2L.
W74-09388

HYDROGRAPHIC FRAMEWORK OF THE DOBOY SOUND ESTUARY AND SURVEYS OF THE OTHER TIDAL INLETS ALONG THE COAST OF GEORGIA,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 2L.
W74-09582

AN EXPERIMENTAL STUDY OF DRAINAGE BASIN EVOLUTION AND THE INFLUENCE OF LANDFORMS ON HYDROLOGIC VARIABLES,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
For primary bibliographic entry see Field 4A.
W74-09586

DEVELOPMENT OF THE TURBIDITY MAXIMUM IN A COASTAL PLAIN ESTUARY,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 2L.
W74-09587

AVALANCHE STUDIES IN THE SAN JUAN MOUNTAINS OF SOUTHWESTERN COLORADO,
Colorado Univ., Nederland. Inst. of Arctic and Alpine Research.
For primary bibliographic entry see Field 2C.
W74-09607

INFLUENCE OF SUCTION AND BLOWING ON ENTRAINMENT OF SAND PARTICLES,
Waterloopkundig Laboratorium, Delft (Netherlands).
D. M. Oldenziel, and W. E. Brink.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY7, Paper 10672, p 935-949, July 1974. 11 fig, 3 tab, 18 ref, 2 append.

Descriptors: *Bed load, *Porous media, *Sediment transport, Shear stress, Particle size, Pore water, Alluvial channels, Hydraulic models, Groundwater movement.

An upward flow of water through a porous sand bed reduces the apparent weight of the sand particles and therefore their stability. This effect increases the rate of transport. From literature it is known however, that upward flow also reduces the flow velocity near the bed and the bed shear stress, which decreases the rate of transport. The predominating effect depends on the flow conditions in and above the bed. Downward flow gives opposite effects. Both aspects were examined and the theoretical relations were compared with the results of experiments that were carried out in the Delft Hydraulics Laboratory. For the range of grain sizes studied, downward flow always decreased the rate of sand transport whereas upward flow increased this rate. The grain size of the transported particles was greater than that of the bed particles. This effect was enhanced with downward flow and was less pronounced for upward flow. (Knapp-USGS)
W74-09616

ESTIMATION OF WASHLOAD PRODUCED ON CERTAIN SMALL WATERSHEDS,
New York State Univ., Buffalo. Dept. of Civil Engineering.
O. Rendon-Herrero.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY7, Paper 10638, p 835-848, July 1974. 10 fig, 1 tab, 9 ref, 2 append.

Descriptors: *Sediment yield, *Suspended load, *Unit hydrographs, *Hydrograph analysis, Land use, Storm runoff, Overland flow, Sediment discharge, Small watersheds, *Pennsylvania.
Identifiers: *Bixler Run(Pa).

To predict suspended load production on small watersheds, a method is presented that is analogous to the unit-hydrograph method. The ordinates of a sediment discharge graph are divided by the excess runoff that mobilized it, producing a unit sediment discharge graph. For many storm events, unit sediment discharge graphs are generated that vary considerably in peak value and shape. The ordinates of the graphs are then plotted logarithmically against their respective excess runoff, yielding data points that can be fitted by straight lines. Estimation of the sediment discharge or of a sediment discharge graph for a given excess runoff can therefore be accomplished. Bixler Run Watershed, Pa., 15 sq miles in area, was used as a data source. Granulometric tests disclosed that the suspended sediment in Bixler Run is predominately washload. (Knapp-USGS)
W74-09618

STOCHASTIC ANALYSIS OF DUNE BED PROFILES,
Harza Engineering Co., Chicago, Ill. Water Resources Planning Div.
B. K. Lee, and H. E. Jobson.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY7, Paper 10657, p 849-867, July 1974. 8 fig, 5 tab, 15 ref, 2 append.

Descriptors: *Bed load, *Channel morphology, *Dunes, Profiles, Flumes, Hydraulic models, Stochastic processes, Sand waves, Sediment transport, Statistics, Dispersion, Probability.

Application of stochastic models of bed-load transport and dispersion requires a knowledge of the probability distributions of the step lengths and the rest periods of the particles. The probability distributions of the rest periods, the elevation of particle deposition, and the elevation of particle erosion were obtained in a large flume from a continuous record of bed elevation at a fixed point as a continuous function of time. The probability distribution of the step lengths was obtained from a series of instantaneous longitudinal bed profiles and the distribution of the elevation of particle deposition and erosion. Using an existing transport equation, the total sediment transport in the flume was predicted for three flow conditions. The errors in the predicted total sediment transport rates were -3.0%, +3.5%, and +80.1%. (Knapp-USGS)
W74-09619

VARIATION IN WIDTH-DISCHARGE RELATION AND SOME IMPLICATIONS FOR HYDRAULIC GEOMETRY,
Sheffield Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 8B.
W74-09632

STUDIES OF THE SEASONAL VARIATION OF THE SUSPENDED MATTER OF THE MENAI STRAITS. II. MID STREAM DATA,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 5B.
W74-09741

SURFACE SEDIMENTS IN HAMANA LAKE, THE PACIFIC COAST OF CENTRAL JAPAN,
Shizuoka Univ. (Japan). Faculty of Science.
For primary bibliographic entry see Field 2H.
W74-09751

OCCURRENCE OF LI, B, CU, AND ZN IN SOME EGYPTIAN NILE SEDIMENTS,
Goettingen Univ. (West Germany). Sedimentpetrographisches Institut.
For primary bibliographic entry see Field 5B.
W74-09779

PARTICULATE LEAD CONTAMINATION RECORDED IN SEDIMENTARY CORES FROM LAKE WASHINGTON, SEATTLE,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W74-09791

2K. Chemical Processes

LASER RAMAN SPECTROSCOPY OF SOLUTES DISSOLVED IN WATER FROM A REMOTE PLATFORM,
Rhode Island Univ., Kingston. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-09255

CHEMICAL SURVEY OF WATERS ADJACENT TO COLONELS ISLAND, GLYNN COUNTY, GEORGIA,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5A.
W74-09584

GEOLOGY AND QUALITY OF WATER IN THE MODESTO-MERCED AREA, SAN JOAQUIN VALLEY, CALIFORNIA, WITH A BRIEF SECTION ON HYDROLOGY,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4A.
W74-09605

PRESENT STATE AND PROSPECTS OF USE OF THERAPEUTIC MINERAL WATERS IN THE IRKUTSK OBLAST (SOSTOYANIYE I PERSPEKTIVY ISPOL'ZOVANIYA LECHEBNYKH MINERAL'NYKH VOD IRKUTSKOY OBLASTI),
Institut Zemnoi Kory, Irkutsk (USSR).
V. F. Kaurov, Ye. V. Pinneker, and P. I. Trofimuk.
In: Ocherki po gidrogeologii Sibiri; Komissiya po Izucheniyu Podzemnykh Vod Sibiri i Dal'nego Vostoka Materialy, No 6, p 58-64, Novosibirsk, 1973.

Descriptors: *Water chemistry, *Water quality, *Mineral water, Salts, Chlorides, Sulfates, Water types, Saline water, Brines, Springs, Water wells, Water utilization, Human population.
Identifiers: *USSR(Irkutsk Oblast), Mineral springs, Spas, Balneology, Hydropathy, Mineralization.

The Irkutsk Oblast has an abundance of therapeutic waters which vary in degree of mineralization, composition, and temperature. The vast Angara-Lena Basin on the Siberian Platform contains therapeutic brines and saline waters. Thermal, carbonic acid, and radon waters are found in mountains of eastern Sayan and the Baykal uplands. Brines of deep horizons are of calcium- or sodium-chloride types and contain such balneologically active components as hydrogen sulfide, bromine, and radon. Sodium-chloride, calcium-chloride, calcium-sulfate, and sodium-sulfate waters occur at relatively shallow depths (100-700 m). About 250 springs and wells containing therapeutic mineral waters have been discovered in the Oblast. Only three spas in the Oblast are presently using mineral waters. Local sanatoriums can today accommodate 1,250 persons out of a population of about 2.5 million. When completed, the 'Novoye Usol'ye spa will increase total accomodations to 1,800, a figure considerably lower than 1970 requirements (4,000-4,500). Based on a projected population of 2.8 million by 1975, sanatoriums will soon have to provide facilities for 5,000 persons. Problems in the use of mineral waters in the Oblast in 1971-80 include: (1) expansion and reconstruction of existing spas; (2) elimination of strong hydrogen-sulfide brines near Novonukutsk village for construction of a large spa; (3) organization of new regional sanatoriums; (4) construction of hydropathic establishments for treatment of diseases in almost all administrative centers in the Oblast; and (5 construction of mineral-water bottling plants. Consideration must be given to construction of a locality around Lake Baykal for exploitation of the region's hydromineral resources. (See also W74-09641) (Josefson-USGS)
W74-09644

MINERAL WATERS OF NILOVAYA PUSTYN', THEIR REGIME AND RESOURCES (MINERAL'NYYE VODY NILOVOY PUSTYNI, IKH REZHIM I RESURSY),
Institut Zemnoi Kory, Irkutsk (USSR).
I. M. Borisenko.
In: Ocherki po gidrogeologii Sibiri; Komissiya po Izucheniyu Podzemnykh Vod Sibiri i Dal'nego Vostoka Materialy, No 6, p 107-112, Novosibirsk, 1973. 3 tab.

Descriptors: *Water chemistry, *Water quality, *Mineral water, Salts, Springs, Thermal water, Gases, Hydrogeology, Structural geology.
Identifiers: USSR(Buryat ASSR), Balneology, Mineralization, *USSR(Nilovaya Pustyn').

Mineral waters of Nilovaya Pustyn' discharge in the valley of the Ikhe-Ukhgun' River (tributary of the Irkut), 7 km north of Turan village, Tunkinskiy Rayon, Buryat ASSR. The chemical composition of the waters is of the sodium-sulfate type with a mineralization of 1 g/liter. On the basis of data of detailed explorations in 1967, the rate of discharge of mineral waters was found to be 1,816 cu m/day. The mineral waters are characterized as thermal with a constant temperature (40-42 deg C). Mineral waters of Nilovaya Pustyn' are widely used in the Irkutsk Oblast, Buryat Assr and other regions. The waters have a very therapeutic effect in the treatment of many diseases. The high therapeutic properties of the mineral waters should provide an impetus for establishment of a large spa at Nilovaya Pustyn'. (See also W74-09641) (Josefson-USGS)
W74-09645

ANTIMONY IN GROUNDWATER OF THE KADAMDZHAY DEPOSIT (SUR'MA V PODZEMNYKH VODAKH KADAMDZHAYSKOGO MESTOROZHDENIYA),
Tomsk Polytechnic Inst. (USSR).
For primary bibliographic entry see Field 4B.
W74-09648

TEMPERATURE AND SALINITY STATISTICS OF SURFACE WATERS OF THE ATLANTIC OCEAN (STATISTIKA TEMPERATURY I SOLENOSTI POVERKHNOSTI ATLANTIKI),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
Ye. G. Agafonava, and A. S. Monin.
Akademiya Nauk SSSR Doklady, Vol 207, No 3, p 586-588, 1972. 1 fig, 1 ref.

Descriptors: *Atlantic Ocean, *Surface waters, *Salinity, *Temperature, *Statistical methods, Correlation analysis, Regression analysis.
Identifiers: USSR, Probability density, Probability distribution.

Natural relations between heating, cooling, evaporation, precipitation, and horizontal and vertical movements of water create a specific statistical relation between temperature and salinity of ocean water. This statistical relation is a distict characteristic of both ocean and world climates. The most complete description of this statistical relation is the two-dimensional probability density p(S,T), where S is salinity and T is temperature of ocean water. This function can be used to describe the thermodynamic state of the world ocean and to compare climates of individual seas. The function was derived for surface waters of the Atlantic on the basis of data gathered by the Instiute of Oceanology of the USSR Academy of Sciences. These data encompass 80% of all data accumulated throughout the world during the last 100 years. For the Atlantic, these data cover about 70,000 stations, 90% of which relate to the period 1925-65. Most observations were conducted north of 40 deg North Latitude and mainly in summer. (Josefson-USGS)
W74-09650

AQUA REGIA FOR QUANTITATIVE RECOVERY OF MERCURIC SULFIDE FROM SEDIMENTS,
Michigan State Univ., East Lansing. Dept. of Crop and Soil Sciences.
For primary bibliographic entry see Field 5A.
W74-09763

A NEW VANADYL (IV) THIOCYANATE METHOD FOR THE SPECTROPHOTOMETRIC DETERMINATION OF VANADIUM (IV),
Andhra Univ., Waltair (India). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-09765

QUANTITATIVE SEPARATION OF MAGNESIUM AND PALLADIUM FROM NUMEROUS METAL IONS ON TITANIUM TUNGSTATE PAPERS BY ELECTROCHROMATOGRAPHY,
Aligarh Muslim Univ. (India). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-09782

2L. Estuaries

FLORIDA'S SEAWARD BOUNDARIES--A DILEMMA,
Miami Univ., Fla. Ocean Law Program.
For primary bibliographic entry see Field 6E.
W74-09281

PROTECTING AMERICA'S ESTUARIES: FLORIDA (PART 2).
For primary bibliographic entry see Field 5G.
W74-09283

THIBODAUX PUBLIC HEARING TESTIMONY.
Louisiana Advisory Commission on Coastal and Marine Resources, Baton Rouge.
For primary bibliographic entry see Field 6E.
W74-09288

RECENT FEDERAL LEGISLATION SIGNIFICANT IN ENVIRONMENTAL PLANNING PROGRAMS OF THE STATE OF TEXAS.
Texas Law Inst. of Coastal and Marine Resources, Houston.
For primary bibliographic entry see Field 6E.
W74-09316

ENVIRONMENTAL CONSIDERATIONS FOR WATER MANAGEMENT DISTRICT 6 OF COLLIER COUNTY,
Collier County Conservancy, Inc., Naples, Fla.
For primary bibliographic entry see Field 6B.
W74-09360

EFFECTS OF SALINITY AND SUSPENDED SEDIMENT ON TURBULENT DIFFUSION OF POLLUTANT IN PUERTO RICO,
Puerto Rico Univ., Mayaguez. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-09362

TIDAL CURRENTS, SEDIMENT TRANSPORT, AND SAND BANKS IN CHESAPEAKE BAY ENTRANCE, VIRGINIA,
Old Dominion Univ., Norfolk, Va. Inst. of Oceanography.
J. C. Ludwick.
Technical Report No 16, November 15, 1973. 13 p, 4 fig, 1 tab, 14 ref. ONR-GP Contract N00014-70-C-0083.

Descriptors: *Sediment transport, *Estuaries, *Chesapeake Bay, Currents(Water), Tides, Sedimentary structures, Sands, *Virginia.

The mean of tidal current measurements at ebb and flood strength in the entrance of Chesapeake Bay are nearly equal at 42 cm/sec. At individual stations, ebb maximum is 79 cm/sec; flood maximum is 66 cm/sec; however, at more than half the observation stations, maximum flood speed and duration exceed maximum ebb speed and duration. At 19 of 24 stations, ebb-directed sediment transport exceeds flood-directed sediment transport. Much of the longer flood is incompetent and the greater ebb shear stress more than offsets larger flood speeds. Net sediment transport is directed landwards only in parts of channels and in dead-end sinuses which are re-entrant into shoals and open to flood currents. In the Chesapeake Bay entrance net sediment transport at the headlands is directed seaward. Individual shoals within the entrance are bounded on one side by a net sediment transport to seaward and on the other side by a net sediment transport to landward. Ebb deltas and flood deltas occur in alternate succession across the entrance. There is also an interior flood delta found where ebb-directed sediment is interdicted and swept landwards in a flood-dominated channel. (Knapp-USGS)
W74-09368

THE COOPER RIVER ENVIRONMENTAL STUDY.
South Carolina Water Resources Commission State Water Plan Report No 117, April 1974. 164 p.

Descriptors: *Estuaries, *South Carolina, *Saline water intrusion, *Flow control, Path of pollutants, Stratified flow, Streamflow, Discharge(Water).
Identifiers: *Cooper River(SC), *Charleston Harbor(SC).

Construction of the Santee-Cooper complex in 1942 diverted substantial quantities of water from the Santee River into the Cooper River system. Not only did this modify the volumes of flow in both rivers, but it also produced an alteration of the Charleston Harbor environment characterized by stratifications of water which had previously been a more or less homogenous fresh and saline mixture. At the interface between tidal saline inflows and the less dense overriding freshwater, suspended material in downstream transport settles out and creates problems to navigation by its deposition in ship channels. The solution under consideration is to redivert a substantial part of the Cooper River back to its former natural course. The net effect will be a reduction of siltation in the harbor and an accompanying alleviation of the need for extensive harbor dredging. In order to study some of the questions that may accompany reduced flows in the Cooper River, a controlled low-flow period was scheduled. A mixed estuary will provide for more rapid seaward transport of bottom materials, returning this feature to prediversion conditions. The removal of such deposits will reduce oxygen uptake potentials in lower Cooper River and elsewhere in the Harbor thus alleviating previous concern of septicity that could occur during periods of low flow and elevated temperature. (See W74-09380 thru W74-09389) (Knapp-USGS)
W74-09379

STANDING CROPS OF AQUATIC ORGANISMS IN TIDAL STREAMS OF THE LOWER COOPER RIVER SYSTEM, SOUTH CAROLINA,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Estuarine Fisheries Center.
W. R. Turner, and G. N. Johnson.
In: Cooper River Environmental Study: South Carolina Water Resources State Water Plan Report No 117, p 13-20, April 1974. 2 fig, 4 tab.

Descriptors: *Estuaries, *Standing crops, *Productivity, *Aquatic life, *South Carolina, Aquatic animals, Fish, Aquatic productivity, Surveys, Aquatic populations, Fish populations, Biomass.
Identifiers: *Cooper River(SC).

Estimates of the standing crop and species composition of free-swimming aquatic macroorganisms were obtained in three tidal streams of the lower Cooper River system, South Carolina, once each during the spring, summer, and fall of 1971 to provide baseline data prior to further habitat modification. Forty-five species of fishes and three species of crustaceans were collected in the combined samples from the three streams. Although a greater number of species was collected during the fall (35) than during summer (33) and spring (26), greater numbers of individuals were taken during the summer (503,000/acre) and spring (189,000/acre); a mean of 122,000/acre was collected during the fall. Ten species of fishes made up 95% of the total fish catch, and three of these species accounted for 75% of that total; they were Atlantic croaker, Atlantic menhaden, and mummichog, in order of abundance. The grass shrimp was by far the most abundant of all organisms present and constituted 96% of the total number of invertebrates. Mean biomass for the three surveys was 249 pounds/acre. Invertebrates were 63% of that weight with grass shrimp accounting for 131 pounds/acre and blue crab, 19 pounds/acre. American eel dominated the fish biomass and was represented by 16 pounds/acre. The studies strongly emphasized the importance of the tidal streams as nursery areas as 65% of all organisms collected and many of the predominant forms were represented almost entirely by larval, post-larval, and juvenile stages. (See also W74-09379) (Knapp-USGS)
W74-09380

VERTICAL DISTRIBUTION OF EPIPHYTIC ALGAE ON SPARTINA ALTERNIFLORA FROM TRANSECTS ALONG THE COOPER AND WANDO RIVERS,
South Carolina Univ., Columbia.
W. T. Batson, and B. C. Blackwelder.
In: Cooper River Environmental Study: South Carolina Water Resources State Water Plan Report No 117, p 22-35, April 1974.

Descriptors: *Algae, *Estuaries, *South Carolina, Data collections, Aquatic bacteria, Aquatic microorganisms.
Identifiers: *Cooper River(SC), *Spartina alterniflora.

Stalks of Spartina alterniflora from the Cooper and Wando Rivers, S.C., were collected and examined to detect the presence of epiphytic algae. Fifteen species of algae were found in the transects examined. Nine species were of the phylum Cyanophyta, three species were of the phylum Rhodophyta, and three species were of the phylum Chlorophyta. The most abundantly occurring species were Chaetomorpha minima and Entophysalis conferta. Other than algae, the most abundantly occurring epiphytes were bacteria. (See also W74-09379) (Knapp-USGS)
W74-09381

VASCULAR PLANT SURVEY OF MARSH AND ADJACENT HIGHLAND IN SELECTED PORTIONS OF COOPER RIVER AND WANDO RIVER,
South Carolina Univ., Columbia.
W. T. Batson.
In: Cooper River Environmental Study: South Carolina Water Resources State Water Plan Report No 117, p 36-40, April 1974. 1 tab.

Descriptors: *Sampling, *Marsh plants, *Marshes, *Vegetation, Estuaries, Grasses, Data collections, Aquatic weeds.
Identifiers: *Cooper River(SC).

During the last half of June and the first half of July 1971, a floristic survey was conducted in the Charleston Harbor area. The study area consisted of marshlands only, and was dominated by Spartina and Juncus communities. The creek margins as well as those of the river gave evidence of a gradual long term, but significant rise in water level. This evidence was of three types. First, Juncus communities sometimes extended down to low tide level, although normally this type community develops only on higher ground and is separated from low tide level by a band of Spartina. Second, in the Juncus communities that extended to low tide level, it was frequently noted that 10 to 20 foot wide sections of the densely rooted sod had cracked deeply (1-3 feet) and tilted toward the water, and in that position was rapidly being destroyed by tidal erosion. Third, in areas where hammocks or low mounds with trees occurred, the outer trees were frequently dead and marsh vegetation invading. (See also W74-09379) (Knapp-USGS)
W74-09382

THE VEGETATION OF THE COOPER RIVER ESTUARY,
South Carolina Univ., Columbia.
R. Stalter.
In: Cooper River Environmental Study: South Carolina Water Resources State Water Plan Report No 117, p 41-45, April 1974. 2 fig, 1 tab.

Descriptors: *Sampling, *Marsh plants, *Marshes, *Vegetation, Estuaries, Grasses, Data collections, Aquatic weeds.
Identifiers: *Cooper River(SC).

The vegetation of the Cooper River Estuary, South Carolina is adapted to salinity and duration and depth of flooding. The vegetation zones, listed in order of decreasing elevation above sea level are: the upper high marsh, the zone of low soil salt content (0.5% or less) and infrequent flooding, occupied by the high tide bush, sea-myrtle, high water grass, and occasionally by switch-grass; the lower high marsh, the zone of moderate soil salt content (0.3 to 3.0%) and infrequent flooding, occupied by needle rush, salt grass, glasswort, saltwater cordgrass, sea lavender, and the sea oxeye; upper low marsh, the zone of moderate to high salt content (0.5 to 3.2% and up to 5.0% in salt pans) and slightly longer periods of flooding than the Lower High Marsh, dominated by a pure stand of dwarf saltwater cordgrass; and the lower low marsh, the zone of moderate soil salt content (0.5 to 3.0%), flooded twice a day by the tides, with submergence as long as 15 hours a day, dominated by a pure stand of tall saltwater cordgrass. (See also W74-09379) (Knapp-USGS)
W74-09383

REPORT ON 'IN SITU' BENTHIC RESPIRATION AND VERTICAL OXYGEN: TEMPERATURE PROFILES.
For primary bibliographic entry see Field 5C.
W74-09384

WATER QUALITY PORTION OF THE COOPER RIVER ENVIRONMENTAL STUDY.
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5B.
W74-09385

CHARLESTON AREA SEDIMENT SAMPLES,
South Carolina Pollution Control Authority, Columbia.
For primary bibliographic entry see Field 5A.
W74-09386

SURFACE WATER HYDRAULICS.
In: Cooper River Environmental Study: South Carolina Water Resources State Water Plan Report No 117, p 119-123, April 1974. 2 fig, 2 tab.

Descriptors: *Estuaries, *South Carolina, *Saline water intrusion, *Flow control, Path of pollutants, Stratified flow, Streamflow, Discharge(Water).
Identifiers: *Cooper River(SC), *Charleston Harbor(SC).

Most of the Santee River (South Carolina) streamflow is diverted through Lake Moultrie into the Cooper River. The U.S. Corps of Engineers proposes to redivert the streamflow via a canal from Lake Moultrie to the lower Santee River channel. A sustained flow from Lake Moutrie of 3,000 cfs will probably be sufficient to keep saltwater below the Cooper River entrance to the Durham Creek Canal under normal tidal conditions. Just prior to the 3,000 cfs sustained-flow period, the salt-water wedge at high slack tide came to about mile 13.5, using a conductivity base of 125 micromhos as the delineation between salt and fresh water. The leading edge of the wedge evidences a greater degree of stratification at high and medium fresh-water inflows than at low fresh-water inflows. After three of four days of sustained low-flow the linear extent of high tide penetration became relatively stable. The leading edge of the wedge became a diminution of well-mixed salinity in cross-sections rather than a pronounced wedge effect. The measured values of the investigated parameters remained fairly constant in absolute values at the same depth throughout the cross section. Neither DO nor pH showed much variation from saline to fresh water. At 9,300 micromhos, 16.5 deg C, DO was 7.3 ppm, pH was 7.6; at 160 micromhos, 15.5 deg C, DO was 8.2 ppm, pH was 7.2. (See also W74-09379) (Knapp-USGS)
W74-09387

SEISMIC PROFILES, COOPER RIVER.
In: Cooper River Environmental Study: South Carolina Water Resources State Water Plan Report No 117, p 124-128, April 1974. 4 fig.

Descriptors: *Seismic studies, *Bottom studies, *Estuaries, *South Carolina, Profiles, Stratigraphy, Sedimentation.
Identifiers: *Cooper River(SC).

Seismic methods were used for identification of subsurface rock and sediment strata in the Cooper, Ashley, and Wando Rivers as well as the Charleston Harbor, South Carolina. The seismic study has a direct application in developments that require special foundations or piling, and in works that may involve channel modification or dredging. (See also W74-09379) (Knapp-USGS)
W74-09388

WATER SUPPLY EVALUATION AND PROPOSED COMPREHENSIVE STUDY OF THE CHARLESTON-BUSHY PARK INDUSTRIAL COMPLEX, SOUTH CAROLINA,
Geological Survey, Columbia, S.C.
R. A. Gardner, and P. W. Johnson.
In: Cooper River Environmental Study: South Carolina Water Resources State Water Plan Report No 117, p 130-148, April 1974. 2 fig, 7 tab, 36 ref.

Descriptors: *Water resources development, *Hydrologic data, *South Carolina, Groundwater, Surface waters, Water supply, Data collections, Planning, Water supply, Evaluation.
Identifiers: *Cooper River(SC), *Charleston(SC).

In the area drained by the Ashley and Cooper Rivers, Charleston, South Carolina at least 10 times the amount of water currently being utilized could be developed. Enough data to plan the development of the water resources are not available. An estimated 25 mgd could be developed from surface water sources in the area (excluding diversions into the Cooper River) and an estimated 50 mgd or more could be developed from groundwater sources in the area. A plan is proposed for a full-scale investigation to develop a data system for accurately evaluating the water resources of the area and to establish the effect such development will have. (See also W74-09379) (Knapp-USGS)
W74-09389

THE EFFECT OF PROPOSED DEEPENING OF THE JOHN F. BALDWIN AND STOCKTON SHIP CHANNELS ON SALT-WATER INTRUSION, SUISUN BAY AND SACRAMENTO-SAN JOAQUIN DELTA AREAS, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W74-09408

PATHOGENIC ORGANISMS IN THE MURDERKILL RIVER ESTUARY,
Delaware Univ., Newark. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W74-09466

THE EFFECTS OF WATER RESOURCES DEVELOPMENT ON ESTUARINE ENVIRONMENTS,
Texas Water Development Board, Austin. Coastal Zone Studies Branch and Systems Engineering Div.
J. C. Nelson, D. G. Rauschuber, and L. F. Tischler.
Water Resources Bulletin, Vol 9, No 6, p 1249-1257, 1973. 2 fig, 5 ref.

Descriptors: *Operations research, *Planning, *Water resources development, *Estuarine environment, Bays, *Texas, Limnology, Oceanography, Baseline studies, Hydrologic data, Coasts, Estuaries.

To meet statutory and growing data requirements for understanding the impact of economic growth and increased water demands on the ecosystem of Texas bays and estuaries, the Texas Water Development Board has begun extensive estuarine data collection and research designed to3 91) define relationship between the estuarine ecosystem and fresh water and nutrient inflows and (2) develop quantitative simulation techniques projecting this relationship. With the assistance of the U.S. Geological Survey's reconnaissance studies and the Texas Park and Wildlife's selected coastal zone monitoring, physical and chemical water quality and biological data on the estuarine ecosystem has been collected and analyzed. The Board also initiated the development of mathematical models of bays and estuaries. One, a tidal hydrodynamic model is designed to determine the effects of alternative estuarine development and management plans, providing data on intra-tidal behavior, sediment, water surface elevation and velocity patterns. The estuarine mass transportation model provides data on the distribution of tidal-averaged concentrations of constituents of interest at each nodal point. (Schroeder-Wisconsin)
W74-09556

ECONOMIC DEVELOPMENT STUDY OF THE TEXAS COASTAL ZONE,
Texas A and M Univ., College Station. Industrial Economics Research Div.
For primary bibliographic entry see Field 6B.
W74-09569

CHEMICAL DESCRIPTIONS OF THE OCEANS,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5B.
W74-09570

HYDROGRAPHIC FRAMEWORK OF THE DOBOY SOUND ESTUARY AND SURVEYS OF THE OTHER TIDAL INLETS ALONG THE COAST OF GEORGIA,
Skidaway Inst. of Oceanography, Savannah, Ga.
F. Oertel.
Georgia University Marine Science Center, Skidaway Island, Technical Report Series No 74-1, 1974. 61 p, 17 fig, 11 tab, 51 ref.

Descriptors: *Sediment transport, *Estuaries, *Georgia, Tides, Bores, Sedimentation, Littoral drift, Inlets(Waterways), Shoals, Currents(Water), Water circulation.
Identifiers: *Doboy Sound(GA).

The sediment budget was studied at the entrance of the Doboy Sound estuary, Georgia. Patterns of diversion develop in response to seasonal fluctuations in wind and wave approach interacting with inlet tidal drains. Mutually evasive flow paths of ebb and flood currents influence the formation of shoals adjacent to inlets. Shoals at the entrance to Doboy Sound are partially exposed at low water and exhibit two trends. Three shoals form an elongate-offshore orientation that extends several miles seaward of the entrance. A fourth elongate shoal is oriented parallel to the beach approximately one-quarter mile offshore. During the summer months, sediment is transported in a closed system within these shoals, and there is essentially no sediment by-passing at the inlet although some by-passing apparently takes place seaward of the entrance. This condition results in lateral and vertical expansion of shoals and in sediment 'starved' areas adjacent to shoals. Estuaries with large fluvial sources of water are distinctly different in form and hydrographic character from tidal inlets without fluvial sources of low salinity water. Sedimentation occurring in estuaries with large fluvial sources is generally a response to some form of bi-polar flow associated with a stratified water mass. The tidal inlets generally have large tidal drains that are diverted by mutually evasive tidal channels and inlet surges. (Knapp-USGS)
W74-09582

CHEMICAL SURVEY OF WATERS ADJACENT TO COLONELS ISLAND, GLYNN COUNTY, GEORGIA,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5A.
W74-09584

DEVELOPMENT OF THE TURBIDITY MAXIMUM IN A COASTAL PLAIN ESTUARY,
Virginia Inst. of Marine Science, Gloucester Point.
M. M. Nichols, and G. Thompson.
Available from NTIS, Springfield, Va. 22151 as AD-773 595, Price $3.75 printed copy; $1.45 microfiche. Final Report to U.S. Army Research Office, July 1973. 47 p, 14 fig, 2 tab, 48 ref, 2 append. DA-ARO-D-31-124-G1164 and DA-ARO-D-31-124-70-G47.

Descriptors: *Estuaries, *Turbidity, *Sediment transport, *Virginia, Floods, Sediment distribution, Density currents, Saline water intrusion, Stratified flow.
Identifiers: *Rappahannock Estuary(Va).

Turbidity in the Rappahannock Estuary, Virginia was studied to determine how high concentrations of suspended sediment accumulate to form a maximum. Time-series observations of current velocity, salinity and suspended sediment over 8 to 18 tidal cycles reveal that the maximum forms in a convergence of bottom residual currents near the transition between fresh and salty water. Sediment supplied mainly by the fiver is transported into the convergence by density currents and accumulates where velocity is nearly zero and settling rate exceeds upward current velocity. The maximum forms in the middle estuary after freshet and shifts upstream with landward shift of salt intrusion and diminished river inflow. At the same time, its intensity is reduced by settling out, reduced strength of the convergence, and increased mixing. Prime prerequisites for development are a strong convergence and high river inflow. (Knapp-USGS)
W74-09587

POLLUTION OF GROUNDWATER BY SALT INVASION,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-09594

AN INTERDISCIPLINARY STUDY OF THE ESTUARINE AND COASTAL OCEANOGRAPHY OF BLOCK ISLAND SOUND AND ADJACENT NEW YORK COASTAL WATERS,
Long Island Univ., Greenvale, N.Y. Science Engineering Research Group.
For primary bibliographic entry see Field 5B.
W74-09602

THE COASTAL INTERCEPTOR WATERWAY,
Miami Univ., Fla.
For primary bibliographic entry see Field 5G.
W74-09614

CHANGES IN OXYGEN AND PRIMARY PRODUCTION OF THE PATUXENT ESTUARY, MARYLAND, 1963 THROUGH 1969,
Geological Survey, Edgewater, Md.
For primary bibliographic entry see Field 5B.
W74-09624

STUDIES OF THE SEASONAL VARIATION OF THE SUSPENDED MATTER OF THE MENAI STRAITS. II. MID STREAM DATA,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 5B.
W74-09741

APPLICATION OF REAL-TIME MASS SPECTROMETRIC TECHNIQUES TO ENVIRONMENTAL ORGANIC GEOCHEMISTRY. II. ORGANIC MATTER IN SAN FRANCISCO BAY AREA WATER,
California Univ., Berkeley. Space Sciences Lab.
For primary bibliographic entry see Field 5A.
W74-09742

MIGRATION AND REDISTRIBUTION OF ZINC AND CADMIUM IN MARINE ESTUARINE SYSTEM,
Geological Survey, Corpus Christi, Tex.
For primary t(Tex.),graphic entry see Field 5B.
W74-09777

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

FINAL ENVIRONMENTAL STATEMENT, (OFFICE OF SALINE WATER)--FIVE YEAR EXTENSION RESEARCH AND DEVELOPMENT, PUBLIC LAW 92-60.
Office of Saline Water, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va. 22151, as EIS-73-0266-F, $7.00 paper copy. February 1973. 100 p, 10 ref, append.

Descriptors: *Saline water, *Desalination, *Research and development, *Water supply, *Water management(Applied), Legislation, Water utilization, Water reuse, Sewage, Sewage treatment, Effluents, Water quality, Water resources, Water resources development, Corrosion, Brines, Environmental effects, Surface waters, Groundwater, Weather modification, Cooling water, Industrial water, Municipal water, Agriculture.
Identifiers: *Environmental Impact Statements, San Diego(Calif.), Roswell(N.M), Freepor

Webster(S.D), Wrightsville Beach(N.C.), Fountain Valley(Calif.).

Effects of a five-year extension of the Saline Water Conversion Program for fiscal years 1973 through 1977 are evaluated. The program is designed to develop and demonstrate practical means to convert saline water and other chemically contaminated water to a quality suitable for municipal, industrial, agricultural and other beneficial uses. Current operational aspects of the test facilities such as the concentration of influent water and discharge of brine, the use of water for direct cooling, the introduction of trace quantities of corrosion products and the consumption of energy were determined to have quantitatively negligible impact on the environment. Alternatives to the proposed action which were considered included surface water development, groundwater development, improved water management practices and recycling of sewage and effluents for use in industry and agriculture. Also considered were various forms of weather modification to increase precipitation, as well as taking no action. (Ritchie-Florida)
W74-09280

MEMBRANE REGENERATION FOR WASTEWATER RECLAMATION USING REVERSE OSMOSIS,
Hebrew Univ., Jerusalem (Israel). Human Environmental Sciences Program.
For primary bibliographic entry see Field 5D.
W74-09554

MEMBRANE SCIENCE AND TECHNOLOGY.
For primary bibliographic entry see Field 5D.
W74-09633

3B. Water Yield Improvement

RESULTS GENERATED FROM A ONE-DIMENSIONAL WARM FOG MODEL WHICH SIMULATES HYGROSCOPIC SEEDING,
Navy Weather Research Facility, Norfolk, Va.
P. M. Tag.
Available from NTIS, Springfield, Va 22151 AD-769 226 Price $5.50 printed copy; $1.45 microfiche. Technical Paper No 11-71, May 1971. 63 p, 25 fig, 1 tab, 14 ref.

Descriptors: *Cloud seeding, *Fog, *Weather modification, Artificial precipitation, Chemistry of precipitation.
Identifiers: *Hygroscopic seeding.

The processes involved in clearing fog were studied to provide guidelines for field experimentation. Using a single-dimensional, 10-level, microphysical fog model, computer runs were made to determine the effect of hygroscopic seeding, method of seeding, and fog conditions under which hygroscopic seeding would be effective. Diagrams were drawn to show the degree of dependence of successful clearing upon treatment concentration and droplet spectrum. These diagrams were drawn for two fog types--one, a dense advective fog of depth of 300 m.; the other, a less dense radiation fog of a depth of 150 m. The difficulty of hygroscopic seeding increases with fog depth and water content. (Knapp-USGS)
W74-09322

PROJECT CUM II--STUDIES OF THE RAIN PARAMETERS OF RANDOMLY SEEDED WARM AND COLD CUMULI,
Weather Science, Inc., Norman, Okla.
J. L. Sutherland, and D. R. Booker.
Available from NTIS, Springfield, Va. 22151 as AD-768 970, Price $3.00 printed copy; $1.45 microfiche. Air Force Cambridge Research Laboratories Technical Report AFCRL-TR-73-0515, July 1973. 32 p, 13 fig, 3 tab. AFCRL Contract F19628-70-C-0228.

Descriptors: *Cloud seeding, *Cloud physics, Florida, Oklahoma, Weather modification, Precipitation(Atmospheric), Artificial precipitation.
Identifiers: *Cloud seeding(Hygroscopic).

In a cold cumulus seeding experiment in New Mexico in 1969 silver iodide seeding resulted in more small raindrops and generally fewer large raindrops in light rain. Also, the seeded clouds tended to have higher maximum rainfall rates. Two hygroscopic seeding experiments were run on warm cumuli off the Florida coast and in Oklahoma. The maritime Florida clouds were modified by encapsulated urea seeding so that the initial surge of large raindrops at the beginning of showers was displaced toward the middle of the life of the seeded showers. The slope of the raindrop spectra of the seeded Florida clouds was less steep, implying more large drops and fewer small drops. Even though the raindrop spectra are significantly different, the difference is not large enough to cause a significant difference in the radar reflectivity-rainfall rate relationship. The continental warm cumuli in Oklahoma were not apparently affected by the hygroscopic seeding; however, the seeding amount was appreciably smaller. (Knapp-USGS)
W74-09370

PROCEDURE FOR EVALUATING THE EFFECT OF CONVECTIVE CLOUD MODIFICATION FOR THE PURPOSE OF ARTIFICIALLY CONTROLLING PRECIPITATION AND THE RESULTS OF AIRCRAFT STUDIES ON THE STRUCTURE OF CUMULUS CLOUDS,
M. V. Buykov, F. Ya. Voyt, Ye. Ye. Korniyenko, I. A. Kureyko, and A. I. Furman.
Available from NTIS, Springfield, Va. 22151, as AD-767 986, Price $3.00 printed copy; $1.45 microfiche. Air Force Foreign Technology Division Translation Report FTD-HT-23-804-73, September 1973. 14 p, 1 tab, 20 ref. (Translated from Trudy v Vsesoyuznogo Meteorologicheskogo S Yezda, Sektsiya Aktivnykh Vozdeystviy na Atmosfernyye Protsessy, Vol 4, p 87-96, 1972).

Descriptors: *Cloud seeding, *Weather modification, Cloud physics, Mathematical models, Storm structure, Precipitation(Atmospheric).
Identifiers: *USSR(Ukraine), *Cumulonimbus clouds.

Cumulonimbus clouds may play a major role in artificial control of precipitation over the steppe area of the Ukraine. In the steppe of the Ukraine, developed cumulonimbus clouds have considerable thickness. Their summits are at an altitude of 6-7 km and higher; the temperature at the level of the summit, as a rule, is below -20 deg. A theoretical model was developed to describe the precipitation formation process in cumulonimbus, providing for calculation of total precipitation falling from a cloud during its natural development or during modification. To check the model, field experiments were performed, as a result of which information on total precipitation from seeded and unseeded clouds was obtained. (Knapp-USGS)
W74-09378

WATER SUPPLY EVALUATION AND PROPOSED COMPREHENSIVE STUDY OF THE CHARLESTON-BUSHY PARK INDUSTRIAL COMPLEX, SOUTH CAROLINA,
Geological Survey, Columbia, S.C.
For primary bibliographic entry see Field 2L.
W74-09389

CLOUD SEEDING FOR SNOW AUGMENTATION: LAND USE RAMIFICATIONS OF RESIDUAL SILVER IODIDE NUCLEATING AGENTS,
Colorado State Univ., Fort Collins. Dept. of Microbiology.
For primary bibliographic entry see Field 5B.
W74-09606

3C. Use Of Water Of Impaired Quality

EFFECT OF DETERGENT-LADEN WATER ON THE GROWTH OF CORN,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
W. Kroontje, J. N. Judy, and H. C. H. Hahne.
Available from the National Technical Information Service as PB-233 331, $3.75 in paper copy, $1.45 in microfiche. Virginia Water Resources Research Center, Blacksburg, Bulletin 62, August 1973. 50 p, 5 fig, 22 tab, 25 ref. OWRR A-041-VA(3).

Descriptors: *Detergents, *Waste treatment, Plant Growth, Crop production, *Corn(Field), *Growth rates, *Loam, Soil types, *Regression analysis, *Water reuse.
Identifiers: Norfolk fine sandy loam, Davidson clay loam, Plant yields.

A greenhouse experiment was conducted to determine the effects of two detergents on the growth of corn (Zea mays L.) when the detergent was individually applied to Davidson clay loam and Norfolk fine sandy loam. The detergents used were a heavy-duty non-enzyme detergent (Bz) and a heavy-duty enzyme detergent (Tx). These were applied in irrigation water at concentrations of 0, 20, 800, 1600, 4800, 8000, 10,000, 12,000 and 14,000. Stimulations in growth occurred on the Davidson soil that received 1600 ppm Bz and 800, 1600, 4800, and 8000 ppm Tx, and on the Norfolk soil that received 800 ppm Tx. These stimulations were attributed to responses to phosphorus contained in the detergents. Abnormal growth characteristics were observed on many treatments, and yield decreases were noted on the Davidson soil that received 8000, 10,000, 12,000 and 14,000 ppm Bz and 14,000 ppm Tx. Regression analyses showed that the detrimental effects on plant yields were due to soluble salt damages caused by the sodium in the detergents on all treatments except where Tx was applied to the Norfolk soil. In the latter case, specific sodium effects could not be separated from general salinity effects. Detergent Bz was more detrimental to plant growth than Tx.
W74-09256

APPLICATION OF SEWAGE SLUDGE TO AGRICULTURAL LAND IN MINNESOTA (FINAL ENVIRONMENTAL STATEMENT),
Agricultural Research Service, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-09265

WATER BALANCE IN SEWAGE STABILIZATION LAGOONS,
North Dakota Univ., Grand Forks. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-09361

STUDIES ON INTERNAL REUSE OF SULFITE EVAPORATOR CONDENSATES (UNTERSUCHUNGEN ZUR INNERBETRIEBLICHEN WIEDERVERWENDUNG VON SULFITABLAUGENEINDAMPFKONDENSATEN),
Institut fuer Zellstoff und Papier, Heidenau (East Germany).
For primary bibliographic entry see Field 5D.
W74-09453

WASTEWATER RECLAMATION: SOCIOECONOMICS, TECHNOLOGY, AND PUBLIC ACCEPTANCE.
Ralph Stone and Company, Inc., Los Angeles, California.
For primary bibliographic entry see Field 5D.
W74-09662

HUMIDITY EFFECTS ON YIELD AND WATER RELATIONS OF NINE CROPS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
G. J. Hoffman.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 1, p 164-167, January-February, 1973. 2 fig, 3 tab, 12 ref.

Descriptors: *Humidity, *Crop response, Mist, Moisture, Precipitation(Atmospheric), Water vapor, Yield equations, Water utilization, *Salt tolerance.

The effect of humidity on the growth, yield, and water relations of nine crops grown under essentially the same controlled environmental conditions is described. Having essentially the same environment makes comparisons among crops possible. The data have been taken from various experiments conducted at the U.S. Salinity Laboratory to establish the interaction between atmospheric relative humidity and the salt tolerance of the crop. All the data reported are from nosaline treatments. The results are therefore independent of salinity. (Skogerboe-Colorado State)
W74-09796

3D. Conservation In Domestic and Municipal Use

COMMUNICATIONS FOR URBAN WATER RESOURCES MANAGEMENT--A REVIEW AND ANNOTATED BIBLIOGRAPHY,
Gates (W. E.) and Associates, Inc., Fairfax, Va.
For primary bibliographic entry see Field 6B.
W74-09251

DECISION ANALYSIS ON WATER RESOURCES PLANNING AND MANAGEMENT FOR AN ARID METROPOLITAN CENTER IN WEST TEXAS,
Texas A and M Univ., College Station. Water Resources Inst.
For primary bibliographic entry see Field 6A.
W74-09364

THE FUTURE OF THE URBAN HABITAT,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6E.
W74-09413

LAND-USE INSTITUTIONS IN THE WASHINGTON-BALTIMORE REGION-A MIRROR FOR METROPOLITAN AMERICA,
Carnegie Institution of Washington, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-09414

LAND-USE RESEARCH ISSUES SUGGESTED BY A NATIONAL URBAN GROWTH STRATEGY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Urban Studies and Planning.
For primary bibliographic entry see Field 4A.
W74-09415

CONTINUOUS SIMULATION MODELS IN URBAN HYDROLOGY,
Organization Stanford Univ., Calif.
R. Linsley, and N. Crawford.
Geophysical Research Letters, Vol 1, p 59-62, May 1974. 2 fig, 10 ref.

Descriptors: *Simulation analysis, *Urban hydrology, *Storm runoff, Planning, Management, Probability, Information retrieval, Rainfall, Hydrographs, Storage, Volume, Streamflow, Water quality, Water quantity, Flood control, Channels, Storm drains, Design, Watersheds(Basins), Hydrologic data, Computer models, Systems analysis.
Identifiers: Flowcharts, Peak flow.

Continuous hydrologic simulation is defined and the Hydrocomp Simulation Program, a version of the Stanford Watershed Model, is described. The information needs for urban water management systems are discussed and the use of continuous simulation of hydrologic data in meeting these information needs is reviewed. The most important information for dealing with problems of urban storm runoff and urban storm runoff quality is the probability of occurrence of events of various magnitudes. This information is readily obtainable through the use of continuous simulation models. It is not obtainable with discrete event simulation models based on the assumption that the probability of the runoff event is equal to the probability of the rainfall event which caused it. (Bell-Cornell)
W74-09479

MEAN PRECIPITATION AND SNOWFALL MAPS FOR A MOUNTAINOUS AREA OF POTENTIAL URBAN DEVELOPMENT,
Atmospheric Environment Service, Vancouver, (British Columbia).
For primary bibliographic entry see Field 2C.
W74-09612

INDEPENDENT COMPARISON OF THREE URBAN RUNOFF MODELS,
Monash Univ., Clayton (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-09629

URBANIZED AREAS SERVED BY SEWERS AND SEPTIC TANKS IN THE SEATTLE-TACOMA URBAN COMPLEX AND ADJACENT AREAS, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 7C.
W74-09639

PUBLIC WATER SUPPLIES IN THE SEATTLE-TACOMA URBAN COMPLEX AND ADJACENT AREAS, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 7C.
W74-09640

OPTIMAL CONTROL OF FLOW IN COMBINED SEWER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-09652

URBAN PUBLIC POLICY AND POLITICAL INSTITUTIONS FOR WATER QUALITY MANAGEMENT ON LAKE ERIE: YEAR TWO,
Battelle Columbus Lab., Ohio.
For primary bibliographic entry see Field 5G.
W74-09653

COMPUTER MODELING APPLICATIONS IN URBAN WATER PLANNING,
Denver Board of Water Commissioners, Colo.
For primary bibliographic entry see Field 6A.
W74-09654

METHOD FOR TREATING WATER CONTAINING SUSPENDED SOLIDS FROM A SANITARY SYSTEM,
Ecodnye Corp., Chicago, Ill. (assignee).
For primary bibliographic entry see Field 5D.
W74-09724

3E. Conservation In Industry

REUSE AND RECYCLE OF WATER IN INDUSTRY,
Bostock Hill and Rigby, Birmingham (England).
For primary bibliographic entry see Field 5D.
W74-09444

STUDIES ON INTERNAL REUSE OF SULFITE EVAPORATOR CONDENSATES (UNTERSUCHUNGEN ZUR INNERBETRIEBLICHEN WIEDERVERWENDING VON SULFITABLAUGENEINDAMPFKONDENSATEN),
Institut fuer Zellstoff und Papier, Heidenau (East Germany).
For primary bibliographic entry see Field 5D.
W74-09453

PULP MILL WASTE WATERS: DISCHARGE AND PURIFICATION (ZELLSTOFFABWAESSER: ANFALL AND REINIGUNG),
Technische Hochschule, Vienna. (Austria). Institut fuer Wasserversorgung Abwasserreiningung und Gewasserschuts.
For primary bibliographic entry see Field 5D.
W74-09455

CLEANING UP: PAPER INDUSTRY'S MESS,
For primary bibliographic entry see Field 5G.
W74-09458

WASTE WATER LOADS AND THEIR POSSIBLE REDUCTIONS IN THE FINNISH FOREST INDUSTRY (SUOMEN METSAETEOLLISUUDEN JAETIEVESIKUORMITUS JA SEN KEHITYSNAEKMAT),
Finnish National Water Board, Helsinki.
For primary bibliographic entry see Field 5B.
W74-09465

POSSIBILITIES FOR REDUCING THE EFFLUENT LOAD OF SULFITE PULP MILLS (MOEGLICHKEITEN ZUR BEHEBUNG DER ABWASSERBELASTUNG DURCH SULFITZELLSTOFFANLAGEN),
For primary bibliographic entry see Field 5D.
W74-09474

PAPER INDUSTRY AND ENVIRONMENTAL QUALITY,
International Paper Co., Ticonderoga, N. Y. Solid Waste Management.
For primary bibliographic entry see Field 5D.
W74-09475

THE ENVIRONMENTAL IMPACT CONCEPT, AND ITS EFFECT ON THE NATIONAL GAS INDUSTRY,
Southwest Research Inst., San Antonio, Tex.
For primary bibliographic entry see Field 5C.
W74-09489

ECONOMIC IMPACT OF FWPCA WATER EFFLUENT STANDARDS AND GOALS.
For primary bibliographic entry see Field 5D.
W74-09497

STATE-OF-THE-ART OF WASTE DISPOSAL IN THE COATINGS INDUSTRY (AS OF JUNE 1973),
For primary bibliographic entry see Field 5E.
W74-09506

A TEST OF ALTERNATIVE MODELS FOR PROJECTING COUNTY INDUSTRIAL

PRODUCTION AT THE 2, 3, AND 4-DIGIT STANDARD INDUSTRIAL CODE LEVELS,
Livingston Coll., New Brunswick, N.J.
M. R. Greenberg.
Regional and Urban Economics, Vol 1, No 4, p 397-417, 1972. 1 fig, 5 tab, 38 ref. OWRR C-1629 (No. 3147) (5).

Descriptors: *Appreciation, *Estimating, *Projections, Model studies, Regional economics, *Economic prediction, New York, Water supply, Waste disposal.
Identifiers: *New York Region.

A series of projection techniques designed to estimate the value added by 42 industries in the 23-county New York Region are examined, and alternative combinations of models which consider industrial mixes, regional and intraregional shares are explored. Four potential projection paths--direct county output projections, regional output estimates allocated to county, national value added projections directly allocated to counties, and national projections allocated to the region, then to the county, were considered with the last chosen because of its reliability and limited data requirements. National coefficients developed by the Bureau of Labor and Statistics are utilized, with alternative assumptions as to unemployment, capital investment, and demand, to create a national input-output matrix yielding individual industries' growth rates. To apportion national value added estimates to the region, industries are first classified as to residentiary or supply characteristics utilizing the population ratio, one of the five methods considered. To extrapolate regional shares, variations of the constant share of national output and shift-share techniques are illustrated. Four methods, constant share, shift-share, extrapolation of absolutes output and regression were used to allocate regional shares to the counties. Data problems of each method are explored. (Schroeder-Wisconsin)
W74-09551

SUPPLY-ECONOMIC RELATIONSHIPS OF OFFSHORE PETROLEUM OPERATIONS,
National Petroleum Council, Washington, D.C.
V. M. Brown.
In: Ninth Annual Conference of Marine Industries 'Problems and Opportunities,' September 10-12, 1973, Washington, D.C., p. 243-252. 2 fig., 6 tab.

Descriptors: *Oil fields, *Natural gas, *Leases, *Coasts, Capital costs, Financing, Exploration, Oil industry, Research and development, Forecasting, Drilling, Prices, Fuels.
Identifiers: *Continental shelf.

Predicted doubling of energy requirements suggests a growing need to develop U.S. offshore reserves where 50% of the remaining potential oil and gas supplies lie. The U.S. Energy Outlook Study, source of this report, provides 1971-1985 projections of U.S. energy demand, supply, and financing requirements. Under alternative supply forecasts, the average primary fuel unit revenue required to support various levels of exploration and development is computed. Assuming an intermediate energy requirement, a number of conclusions can be drawn. Domestic energy supplies, presently providing 88% of U.S. requirements may in the future provide between 62-89% of future requirements. By 1985 oil imports are estimated to provide 6-33% of energy requirements and 18-65% of total oil supply. Capital requirements covering all aspects of oil and gas development are expected to range between $88-172 billion over the period to 1985. Lead time requirements are also expected to increase. Impacts of alternative governmental taxing or leasing policy are also evaluated. No future leasing of the remaining 14 million coastal acres could lead to major declines in total domestic production. Removal of the cash bonus payments presently required could lead to price declines of $1.14-$1.33/oil barrel or 9.2 cents-12.3 cents/1000 cu. feet. (Schroeder-Wisconsin)
W74-09552

ECONOMIC DEVELOPMENT STUDY OF THE TEXAS COASTAL ZONE,
Texas A and M Univ., College Station. Industrial Economics Research Div.
For primary bibliographic entry see Field 6B.
W74-09569

SOME CONSERVATION PROBLEMS IN THE METAL-FINISHING INDUSTRY,
Bostock, Hill and Rigby, Birmingham (England).
For primary bibliographic entry see Field 5D.
W74-09577

INDUSTRIAL WASTE TREATMENT OPPORTUNITIES FOR REVERSE OSMOSIS,
Eastman Chemical Products, Inc., Kingsport, Tenn. Polymer Technology Div.; and Eastman Chemical Products, Inc., Kingsport, Tenn. Photographic Technology Div.
For primary bibliographic entry see Field 5D.
W74-09635

REVERSE OSMOSIS: APPLICATION TO POTATO-STARCH FACTORY WASTE EFFLUENTS,
Agricultural Research Service, Philadelphia, Pa. Eastern Utilities Research and Development Div.
For primary bibliographic entry see Field 5D.
W74-09637

PROTEIN RECOVERY FROM PROCESS EFFLUENTS USING ION-EXCHANGE RESINS,
Tasman Vaccine Lab. Ltd., Poole (England). Ecotech Systems Div.
For primary bibliographic entry see Field 5D.
W74-09747

SOLVENT EXTRACTION IN PROCESSES FOR METAL RECOVERY FROM SCRAP AND WASTE,
Warren Spring Lab., Stevenage (England).
For primary bibliographic entry see Field 5D.
W74-09784

3F. Conservation In Agriculture

PROPOSED IRRIGATION DISTRIBUTION SYSTEM FOR POND-POSO IMPROVEMENT DISTRICT (PL 984), KERN COUNTY, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Mid-Pacific Regional Office, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W74-09263

PROCEEDINGS-WORKSHOP ON LAND DISPOSAL OF WASTEWATERS.
North Carolina State Univ., Raleigh. Water Resources Research Inst.
For primary bibliographic entry see Field 5D.
W74-09422

LAND APPLICATION OF WASTEWATER,
Environmental Protection Agency, Washington D.C. Div. of Municipal Waste Water Programs.
For primary bibliographic entry see Field 5D.
W74-09423

IRRIGATION COST FOR LAND DISPOSAL,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-09428

TREATMENT SYSTEMS FOR ANIMAL, AGRICULTURAL AND MUNICIPAL WASTES,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-09430

WATER PROBLEMS IN THE ARID WESTERN REGIONS OF THE USA, (IN RUSSIAN),
For primary bibliographic entry see Field 4A.
W74-09469

FUNCTIONS TO PREDICT OPTIMAL IRRIGATION PROGRAMS,
California Univ., Davis. Dept. of Water Science and Engineering.
J. I. Stewart, R. M. Hagan, and W. O. Pruitt.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 100, No IR2, Paper No 10626, p 179-199, June 1974. 5 fig, 5 tab, 36 ref.

Descriptors: *Irrigation programs, *Irrigation efficiency, *Optimum devesedment plans Evapotranspiration, *Droughts, Scheduling, Soil water, Vegetation, Seasonal, Corn(Field) Research, Measurement, Systems analysis.
Identifiers: *Production functions, *Prediction, Growth characteristics, Production engineering.

Maximum water-use efficiency often occurs at irrigation levels still lower than the maximum profi point. A methodology is presented for predictior of optimal irrigation programs at any given level o irrigation water supply. The prediction is based o analysis of: (1) Davis, California research finding concerning growth characteristics of the cro which influence maximum yield, evapotranspir tion (ET) requirement, soil water uptake, an response to ET deficits; and (2) measurements c climate, soil, and irrigation system performanc which influence the requirement for ET to be sur plied from irrigation, and the percentage of irriga tion water evapotranspired. An optimal progra maximizes profit or water-use efficiency. Pro gramming dates and depths of irrigations are ba on comparison of the estimated sequence of max imum ET rates throughout the season with th sequence of actual ET rates expected if no irrig tion is given. The difference constitutes an ex pected sequence of ET deficits which carefull programmed irrigations may alleviate fully or i part. Time relationships of corn leaf canopy an root system development researched at Davis ar combined with irrigation planning site measur ments of climate, soil, and soil water content t estimate the sequence of ET deficits. Measur ment of actual irrigation operational efficienc completes the needed information. (Bell-Cornell) W74-09476

THE LAND TREATMENT PROCESS FO WASTEWATER RENOVATION,
Illinois, Univ., Urbana. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-09486

ACCELERATED GROWTH IN AGRICU TURAL PRODUCTION AND THE INTERSE TORAL TRANSFER OF RESOURCES,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultur Economics.
J. W. Mellor.
Occasional Paper No. 34, January 1972. 21 p, 1 ta

Descriptors: *Agriculture, *Productivity, *Capi mobility, Prices, Investment, Economic impa Industrial production, Taxes, Political constrain Institutional constraints.
Identifiers: Intersectoral resource flow.

Three areas of intersectoral resource flows are e amined. A historical view of the size and directi of intersectoral resource transfers and the impa

of various institutional devices facilitating such transfers are explored for Taiwan with comparisons to several developing and developed countries. For Taiwan, a table of intersectoral flows between the agricultural and nonagricultural sectors over 1895-1960 is presented. In 1911-20, 1921-25, 1950-55 and 1956-60, for example, the percent of agricultural sales or total agricultural production representing real resource transfers were 50, 30; 40, 25; 40, 20; and 24, 15%, respectively. Variations in transfers caused by institutional changes are identified. The impact of technical change such as new crop varieties, irrigation, and fertilizer use on intersectoral flows is explored. The impact depends on both the capital:output ratio associated with the technical change and the resultant change in consumption of the agricultural sector. The characteristics of technical changes are examined to determine the appropriate institutional devices to maintain the intersectoral transfer. Land taxes, or relative agricultural price declines are cited as preferable over variable input taxes even though political difficulties in utilizing the former exist. (Schroeder-Wisconsin)
W74-09550

GROWTH OF SUBIRRIGATED JAPANESE HOLLY AS AFFECTED BY SOIL TYPE AND DEPTH,
Georgia Univ., Athens. Dept. of Horticulture.
For primary bibliographic entry see Field 2I.
W74-09600

HEAVY MANURE APPLICATIONS: BENEFIT OR WASTE,
Massachusetts Univ., Amherst. Dept. of Plant and Soil Sciences.
For primary bibliographic entry see Field 5D.
W74-09698

EFFECTS OF SOLID BEEF FEEDLOT WASTES ON SOIL CONDITIONS AND PLANT GROWTH,
Kansas State Univ., Manhattan.
For primary bibliographic entry see Field 5D.
W74-09699

GRASS RESPONSE TO APPLICATIONS OF BEEF-CATTLE FEEDLOT RUNOFF,
For primary bibliographic entry see Field 5D.
W74-09700

A STUDY OF CORN RESPONSE AND SOIL NITROGEN TRANSFORMATIONS UPON APPLICATION OF DIFFERENT RATES AND SOURCES OF CHICKEN MANURE,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 5D.
W74-09701

SURFACE RUNOFF NUTRIENT LOSSES FROM VARIOUS LAND DISPOSAL SYSTEMS FOR DAIRY MANURE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-09702

LINER INSERTING MACHINE FOR PIPELINES,
For primary bibliographic entry see Field 8C.
W74-09722

ON THE PRESSURE CHAMBER TECHNIQUE FOR ESTIMATING LEAF WATER POTENTIAL IN SORGHUM,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Dept. of Agronomy.
A. Blum, C. Y. Sullivan, and J. D. Eastin.
Agron J. Vol 65, No 2, p 337-338, 1973. Illus.

Identifiers: *Leaf-water potential, *Pressure chamber technique, *Sorghum, Sorghum-bicolor.

The purpose of this work was to re-evaluate the pressure chamber technique for estimating leaf water potential in sorghum (Sorghum bicolor (L.) Moench), with special reference to problems associated with leaf sample crushing under pressure and pressure rate increase inside the chamber. Pressure chamber readings were compared to Spanner-type thermocouple psychrometer readings on leaves of 5 sorghum genotypes at several stages of growth. A leaf sample holder, constructed from Silicon rubber and accommodated into a brass flange, reduced leaf crushing under pressure. It was found that pressure chamber readings (xylem pressure) cannot be directly used as an estimate of leaf water potential, but should be corrected according to a calibration against a thermocouple psychrometer determination of leaf water potential. Different rates of pressure increase in the chamber affected the regression between xylem pressure and leaf water potential. The regression improved with a greater pressure rate increase as indicated by smaller error variance estimate. No differences were detected between genotypes in this regression. This technique is, therefore, useful if worked out according to a calibration curve at a standard rate of pressure increase.--Copyright 1973, Biological Abstracts, Inc.
W74-09730

CADMIUM UPTAKE BY WHEAT FROM SEWAGE SLUDGE USED AS A PLANT NUTRIENT SOURCE, A COMPARATIVE STUDY USING FLAMELESS ATOMIC ABSORPTION AND NEUTRON ACTIVATION ANALYSIS,
Karolinska Institutet, Stockholm (Sweden). Dept. of Environmental Hygiene.
For primary bibliographic entry see Field 5C.
W74-09758

TIME IT RIGHT,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
E. A. Hiler.
Irrigation Age, Vol 6, No 10, p 10-14, 16, May, 1972. 1 fig, 4 tab.

Descriptors: *Irrigation practices, *Irrigation programs, Soil moisture, Crop response, Irrigation systems, Stress.

Proper irrigation scheduling becomes increasingly important when available water supplies are short and/or costly. With proper irrigation scheduling, improved crop yields can be obtained and, often more importantly, water-use efficiencies can be increased. Both timing and amount of irrigation affect water-use efficiency; however, research has shown timing has the greatest effect because at critical growth stages, excessive crop water deficit can irreversibly reduce the potential yield and quality of the crop. A concept which is useful in optimizing irrigation timing is stress day index (SDI). Various methods for irrigation timing, the SDI concept, how this concept is utilized for timing irrigations, and experimental results comparing the SDI concept with other irrigation timing methods are described. (Skogerboe-Colorado State)
W74-09795

HUMIDITY EFFECTS ON YIELD AND WATER RELATIONS OF NINE CROPS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3C.
W74-09796

GUIDELINES FOR SUCCESSFUL CENTER-PIVOT IRRIGATION,
M. Miller.
Irrigation Age, Vol 6, No 6, p 8, 76-77, January, 1972. 2 fig.

Descriptors: *Irrigation practices, Surface irrigation, *Sprinkler irrigation, Irrigation systems, Irrigation design.
Identifiers: Center-pivot irrigation.

A summary of the factors necessary for successful operation of a center-pivot sprinkler system is presented. A list of Do's and Don'ts has been developed. A state-of-the-art summary is included. (Skogerboe-Colorado State)
W74-09798

MORE PRODUCTION...FEWER IRRIGATIONS,
T. Milligan.
Irrigation Age, Vol 6, No 12, p 20, 21, 26, 27, July, 1972. 1 fig, 1 tab.

Descriptors: *Irrigation practices, *Irrigation programs, Soil moisture, Crop response, Irrigation systems, Surface irrigation.

Irrigation activities are described. Approximate figures for peak water use by various crops are given by climate. (Skogerboe-Colorado State)
W74-09799

OPTIMIZING SURFACE IRRIGATION UNIFORMITY BY NONUNIFORM SLOPES,
CH2M-Hill, Redding, Calif.
G. M. Powell, M. E. Jensen, and L. G. King.
Paper No 72-721 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972, Chicago, Illinois. 19 p, 6 fig, 22 ref.

Descriptors: *Irrigation, *Irrigation practices, Surface irrigation, Farrow irrigation, Irrigation design, Irrigation efficiency, Uniformity coefficient, *Slopes, Mathematical models, Computer models.

A mathematical computer model of surface irrigation was developed to consider nonuniform slopes and depth-dependent infiltration functions. The model is based on a predictor-corrector technique in which the advance for each time increment is predicted and the water surface profile computed. After computing surface and subsurface storage volumes, the predicted advance is adjusted by a volume balance correction procedure. The computation is fast and verification of the model with field data indicates the model is as accurate as measured input field parameters. The model was used to demonstrate the effect of slope profile on water distribution in furrow irrigation. A concave slope profile shows a significant improvement in water distribution over a uniform slope. A convex slope results in a significantly poorer distribution. The model can also be used to evaluate existing surface irrigated fields with uniform or nonuniform slopes. (Skogerboe-Colorado State)
W74-09800

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

RAYSTOWN LAKE--RAYSTOWN BRANCH JUNIATA RIVER, PENNSYLVANIA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 8D.
W74-09262

Field 4—WATER QUANTITY MANAGEMENT AND CONTROL

Group 4A—Control Of Water On The Surface

PROPOSED IRRIGATION DISTRIBUTION SYSTEM FOR POND-POSO IMPROVEMENT DISTRICT (PL 984), KERN COUNTY, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Mid-Pacific Regional Office, Sacramento, Calif.
Available from the National Technical Information Service, Springfield Va. 22151 as EIS-CA-73-1741-F, $5.50 in paper copy. November 1, 1973. 62 p, 1 plate, 1 map, 3 append.

Descriptors: *Water resources development, *Environmental effects, *Water works, *Water management(Applied), *Irrigation engineering, *Agriculture, Water supply, *California, Water demand, Administration, Federal project policy, Project planning, Project purposes, Water yield improvement, Water users, Water quality, Water distribution(Applied).
Identifiers: *Environmental Impact Statements, *Kern Co.(Cal.).

The proposed project is for the construction of irrigation distribution systems consisting of lined and unlined canals, pipelines, pumping plants and related water works. The system would convey 67,000 acre-feet of water per year from the California Aqueduct to about 22,300 acres of District lands where a variety of truck and field crops are grown. An additional 23,400 acres will continue to be irrigated from ground water sources. The imported water supply would alleviate the ground-water overdraft, aiding in halting land subsidence and improving ground-water quality, making for continued use of the District lands for agricultural production. Drainage facilities are not anticipated to be required and no significant effect is forseen on the fish and wildlife populations. Only minor amounts of land will be removed and there is the possibility of a minor increase in mosquito population. Alternatives considered were maintaining the status quo, and obtaining the water supply from other sources. (Sutton-Florida)
W74-09263

BEACH EROSION CONTROL STUDY ON MANATEE COUNTY, FLORIDA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Jacksonville, Fla.
Available from the National Technical Information Service, Springfield Va. 22151 as EIS-FL-73-1462-F, $4.00 in paper copy. September 6, 1973. 40 p, 21 append, 5 photo, 1 map.

Descriptors: *Beach erosion, *Erosion control, *Dredging, *Florida, *Environmental effects, Shore protection, Hurricanes, Accelerated erosion, Flood damage, Turbidity, Currents, Sea water, Bottom fauna, Littoral, Quartz, Silt, Ocean waves, Sea walls, Gulf of Mexico, Swimming, Tourism, Economic impact, Land use, Recreational demand, Land fills.
Identifiers: *Environmental Impact Statements, *Anna Maria Key(Manatee County-Fla.), Coastal waters, Fill permits.

The project of restoring 3.2 miles of eroded beach along the Gulf shore of Anna Maria Key, Manatee County, Florida is evaluated. Periodic nourishment will be required to compensate for erosion losses throughout the 50-year life of the project. About 940,000 cubic yards of material will be dredged from offshore and placed on the beach. The beach will be temporarily closed during construction operations. Dredging will temporarily degrade water quality, and will destroy most benthic animals in bottom sediments and cover those in the beach nourishment area. The basic alternative is to take no action and leave the beach in its present condition. This provides no relief from the problem of rapidly eroding beach and damage to shore structures caused by wind and wave action. Other alternatives such as groins, seawalls, and revetments were considered. Such structures alone are not conducive to the formation and retention of a recreational beach, and represent an obstruction to the natural environment. Except for the loss of limited quantities of marine fauna and commitment of labor resources during dredge and fill activities, no irreversible or irretrievable commitment of resources is expected. (Kelly-Florida)
W74-09264

MAINTENANCE OF THE NEWARK BAY, HACKENSACK AND PASSAIC RIVERS NAVIGATION PROJECT, NEW JERSEY (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, New York, N.Y.
Available from the National Technical Information Service, Springfield, Va., 22151, as EIS-NY-73-0987-F, $4.00 in paper copy. February 9, 1973. 36 p, 6 map, 4 tab, 9 append.

Descriptors: *Permits, *Harbors, *Rivers, *Dredging, *Federal government, Administrative agencies, Channelization, Navigation, Navigable waters, Vessels, Industrial pollution, Industrial wastes, Municipal wastes, Pollutants, Environmental effects, Water quality, Water policy, Water management, *New Jersey, Fishlife, Wildlife, Ecology, Waste discharge, Cities.
Identifiers: *Environmental Impact Statements, *Newark Bay(N.J.), Hackensack River(N.J.), Passaic Rivers(N.J.).

This final environmental impact statement deals with the maintenance of the Newark Bay, the Hackensack and Passaic Rivers Navigation Project, in New Jersey. Before concluding that the project was within the environmental guidelines, the following were considered: environmental implications, social well-being, engineering, economic and other public interest considerations. The feasibility and repercussions of dredging for navigation purposes were emphasized, as the area is a major link in the northeast shipping corridor. Plans for the dredging and channelization were approved, noting the dense industrialization of the area and the dependency of a major portion of the Midwest upon unhindered access to the harbor. Fish and wildlife resources of the area were negligible since industrial and commercial activities and the discharge of sanitary effluent by local communities have already polluted the surrounding waters. Large amounts of polluting substances enter the water daily, especially from industrial sources. (Silber-Florida)
W74-09267

EL DORADO LAKE, WALNUT RIVER, KANSAS, VOLUME 1, (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Tulsa, Okla.
Available from the National Technical Information Service, Springfield, Va., 22151, as EIS-KS-72-5351-F-1. September 1972. 145 p, 42 tab, 29 fig.

Descriptors: *Kansas, *Environmental effects, *Reservoirs, *Surface waters, *Dams, *Flooding(Intentional inundation), Dam construction, Damsites, Water control, Backwater, Flood control, Water utilization, Water supply, Water storage, Stream flow, Wildlife, Water quality control, Recreation, Fisheries, Non-structural alternatives.
Identifiers: *Environmental Impact Statements, *Walnut River(Kan.).

Action involves construction of a dam and reservoir for El Dorado Lake located at river mile 100.2 on the Walnut River in Butler County, Kansas. Project purposes are flood control, water supply, water quality control, and recreation. Flooding and the resultant damages and epidemic threats will be significantly reduced. Water supply will contribute to the growth of the area. The lake will provide a needed recreational resource and increased fishing. About 8,000 acres will be permanently inundated. Fifty-four families living in the project area will need to be relocated as well as two cemeteries. Also, a state highway, several county roads, pipelines, powerlines, and telephone lines will need to be relocated. Some wildlife habitat will be lost and plant species composition will undergo some change. The alternatives include a combination of small lakes with a dry lake, levees, flood plain acquisition, flood plain management, and no action. (Sutton-Florida)
W74-09268

NEW MELONES LAKE STANISLAUS RIVER, CALIFORNIA: SUPPLEMENTAL DATA ON USE OF CONSERVATION YIELD (SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Sacramento, Calif.
Available from the National Technical Information Service, Springfield Va., 22151, as EIS-CA-73-0122-F. January 1973. 215 p, 1 chart, 3 tab, 2 append, 1 map.

Descriptors: *Environmental effects, *Reservoirs, *Surface waters, *Dams, *Flooding(Intentional inundation), Dam construction, Damsites, Water control, Backwater, Flood control, Water utilization, Riparian rights, Water supply, Water storage, Water transfer, *California.
Identifiers: *Environmental impact statement, *New Melones Lake(Calif.).

Project includes the construction of a dam and the creation of a large reservoir on New Melones Lake, Stanislaus River, California. It is to be a part of the Central Valley Project (CVP) and the water yield will be disposed of as part of the Central Valley Project operations. The project will recognize all water rights as well as the existing and projected requirements for water supplies in the local areas adjacent to the Stanislaus River, both upstream and downstream from New Melones Dam. Any excess water will be available for export to other CVP service areas. It is estimated that 285,000 acre-feet of water will be made available by New Melones Reservoir. It is suggested that the availability of these water supplies will encourage urban developers to move onto more valuable agricultural lands. There will be some loss of wildlife habitat and some removal of land from agricultural use for canal and other water conveyance structure sites. Including the release of the full conservation yield downstream, seven alternative uses of the water are discussed as well as the expected impacts on the service areas. (Conko-Florida)
W74-09269

PORT VERDIGRIS 33, INC., VERDIGRIS RIVER, OKLAHOMA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Tulsa, Okla.
Available from the National Technical Information Service, Springfield, Va., 22151, as EIS-OK-73-0603-F. November 6, 1972. 27 p, 2 fig, 2 tab.

Descriptors: *Environmental effects, *Docks *Channel improvement, *Navigation, *Industria plants, Land use, Economic impact, Bulkheads Piers, Excavation, Construction, Dredging Navigable waters, Hazards, Safety factors Agriculture, *Oklahoma.
Identifiers: *Environmental Impact Statements *Port Verdigris(Okla.), *Navigation obstructions.

The project calls for the construction of a barg docking facility parallel to the navigation channels The dock will be located on government property with the storage area located on adjacent privat property. The off-channel location will decreas chances of vessel collisions. The excavate material will be placed ashore to raise the eleva tion of the storage area, thereby reducing th vegetative productivity of the land. The noise leve will be raised due to the increase in traffic an commercial activity. Appearance of the area wi change from rural to industrial. Two adverse ef fects are foreseen. One is the loss of the excavate land area for the dock and the other is the loss o agricultural productivity due to change in land use

The only alternative considered was no development at all. (Conko-Florida)
W74-09270

BEAR CREEK PROJECT, TENNESSEE (FINAL ENVIRONMENTAL STATEMENT).
Tennessee Valley Authority, Chattanooga.
Available from National Technical Information Service Springfield, Va. 22151, as EIS-AL-73-0037-F. December 29, 1972. 248 p, 24 fig, 54 tab.

Descriptors: *Alabama, *Environmental effects, *Reservoirs, *Surface waters, *Dams, *Flooding(Intentional inundation), Dam construction, Damsites, Water control, Backwater, Flood control, Water utilization, Water supply, Water storage, Mussels, Streamflow, Watersheds(Basins), Floodways, Impoundments.
Identifiers: *Environmental Impact Statements, *Bear Creek(Ala).

Proposal is for the development of four reservoirs and four multiple-purpose dams in the Bear Creek watershed in northwest Alabama, and the construction of a nine-mile floodway. The environmental impacts will include shifts in land use in the project area, including the acquisition by the Tennessee Valley Authority (TVA) of 24,000 acres and the impoundment of some 69 miles of unregulated streams into four reservoirs. There will be unavoidable adverse effects on certain archaeological sites and on certain fish and wildlife areas, including a mussel bed containing a rare mussel species. The project will have an impact on stream-oriented ecosystems and certain water quality parameters as well as requiring the relocation of 68 families. Many of these losses will be offset or mitigated by the project. Alternative methods of providing water supply and flood control were considered, including alternative dam site locations. No alternative was found to be more feasible or to obtain the project purposes with less environmental impact. (Conko-Florida)
W74-09271

BUENA VISTA FLOOD PROTECTION PROJECT, BUENA VISTA, VIRGINIA (FINAL ENVIRONMENTAL STATEMENT),.
Army Engineer District, Norfolk, Va.
Available from National Technical Information Service, Springfield, Va. 22151, as EIS-VA-73-0336-F. December 1972. 49 p, 3 tab, 2 map.

Descriptors: *Virginia, *Environmental effects, Surface waters, *Levees, *Flood control, *Floodways, Water control, Water utilization, Water supply, Water transfer, Canals, Channels, Earthworks, Flood protection, Vegetation effects, Biota, Non-structural alternatives.
Identifiers: *Environmental Impact Statements, Buena Vista(Va.).

The project consists of an 11,700 foot levee and floodwall, a 200-foot wide channel 2,800 feet long, 5,700 foot interior drainage canal and three closures to provide flood protection. Construction will result in covering 65 acres of low use wildlife habitat, destruction of some associated vegetation the excavation area as well as on the river bank djacent to the channel and loss of benthic organms in channel improvement areas. There will so be some relocation of businesses, utilities, d transportation facilities, and a favorable effect the community resulting from flood protection. her adverse effects are loss of bottom biota and mporary turbidity during construction and riods of flooding. The alternative proposals considered included no development at all, construction of an upstream reservoir, a 300-foot channel, n-structural measures, and combinations of se. (Conko-Florida)
74-09272

AINTENANCE DREDGING AND JETTY PAIR, HAMPTON HARBOR, NEW HAMPSHIRE (FINAL ENVIRONMENTAL STATEMENT).
Corps of Engineers, Waltham, Mass.
Available from National Technical Information Service, Springfield, Va. 22151, as EIS-NH-73-0605-F. September 5, 1972. 56 p, 2 tab, 3 map.

Descriptors: *New Hampshire, *Environmental effects, *Dredging, *Navigable waters, *Sand bars, Aquatic life, Biota, Benthos, Channel improvement, Marine animals, Marine biology, Harbors, Oceans, Reefs, Shallow waters, Channels, Navigation, Recreation, Alternative planning, Obstructions to flow, Coasts.
Identifiers: *Environmental Impact Statements, *Hampton Harbor(N.H), *Coastal waters.

The project is for the removal of a sand bar across the outer portion of the entrance channel, and rehabilitation of the north jetty at Hampton Harbor, New Hampshire. The proposal includes removal of the sand bar on an annual basis thereafter. Approximately five to eight days are needed to remove the sand plus time for repairs to the jetty. Action will enable continued safe passage of recreational and commercial vessels through Hampton Harbor inlet. Adverse effects include temporary, localized damages to the marine biota, particularly non-burrowing, benthic forms, attributable to dredging and spoiling operations. No perdurable detriments to the ecology or beaches of Hampton Harbor area are foreseen from this action. Alternate methods of dredging and disposal are discussed as well as consideration of no action. (Conko-Florida)
W74-09273

MAINTENANCE DREDGING, CHATHAM (STAG E) HARBOR, MASSACHUSETTS (FINAL ENVIRONMENTAL STATEMENT).
Corps of Engineers, Waltham, Mass.
Available from National Technical Information Service, Springfield, Va. 22151, as EIS-MA-73-0604-F. July 12, 1972. 43 p, 2 tab, 3 map.

Descriptors: *Massachusetts, *Environmental effects, *Dredging, *Navigable waters, *Sand bars, *Sedimentation, Channel improvement, Marine animals, Harbors, Oceans, Reefs, Channels, Shallow waters, Coasts, Shoals, Silting, Sedimentation rates, Navigation, Obstruction to flow.
Identifiers: *Environmental Impact Statements, *Chatham Harbor(Mass.).

The proposal is for maintenance dredging in the lower portion of the 10-foot navigation channel of Chatham (Stag E) Harbor, Massachusetts. The proposed periodic dredging would take place from deep water in Chatham Roads and extend to the Harding Beach peninsula. Approximately 20,000 cubic yards of bottom sediment (sand) would be removed. If sidecast dredging is used, shoal material would be cast along the periphery of the channel. This will allow safe navigation into the harbor to continue. The local economy is dependent on harbor utilization, and the U.S. Coast Guard requires an open, navigable entrance into the harbor. No perdurable detriment to the natural resources of the harbor is expected and only temporary and localized damages are expected to occur in the work areas. The only alternatives are no dredging, or using another method of dredging such as hydraulic dredging which would spoil the sand in upland areas, or bucket dredging which would require dumping the sand offshore. (Conko-Florida)
W74-09274

REPORT OF PROCEEDINGS CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN NORTH CAROLINA, SECTION III, KINSTON PUBLIC HEARING MARCH 1, 1973.
North Carolina Board of Water and Air Resources, Raleigh.
July 1973. 230 p, 16 tab.

Descriptors: *River basin development, *River regulation, *Tributaries, *Water policy, *Water zoning, Water pollution control, Water quality control, Planning, Legislation, Watershed management, Water resources development, Drainage systems, Legal aspects, River systems, Rivers, River basin commissions, Classification, *North Carolina, Administrative agencies.

This report is the third in a series of three records of public hearings concerning state-wide proposals for upgrading the quality of surface waters in sixteen river basins by appropriate changes in their classification. This report contains copies of all materials, briefs, and letters presented, as well as the transcript of the proceedings, at the Kinston, North Carolina public hearing on March 1, 1973. Included are sections of the Laws of North Carolina relating to the policy of the state concerning its water resources and the assignment of classifications to surface waters within the state. Also included are the Rules Applicable to Classifications and Water Quality Standards adopted by the North Carolina Board of Water and Air Resources. Discussion at this hearing concerned the classification of streams in the Neuse River Basin, the Tar-Pamlico River Basin, the White Oak River Basin, the Pasquotank River Basin, the Chowan River Basin, and the Roanoke River Basin. (Craig-Florida)
W74-09275

REPORT OF PROCEEDINGS CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN NORTH CAROLINA, SECTION II, SOUTHERN PINES PUBLIC HEARINGS NOVEMBER 2, 1972.
North Carolina Board of Water and Air Resources, Raleigh.
July 1973. 278 p, 10 tab.

Descriptors: *River basin development, *River regulation, *Tributaries, *Water policy, *Water zoning, Water pollution control, Water quality control, Planning, Legislation, Watershed management, Water resources development, Drainage systems, Legal aspects, River systems, Rivers, River basin commissions, Classification, *North Carolina, Administrative agencies.

This is the second in a series of three records of public hearings concerning state-wide proposals for upgrading the quality of surface waters in sixteen river basins by appropriate changes in their classification. This report contains copies of all materials, briefs, and letters presented, as well as the transcript of the proceedings, at the Southern Pines, North Carolina public hearing on November 2, 1972. Included are sections of the Laws of North Carolina relating to the policy of the state concerning its water resources and the assignment of classifications to surface waters within the state. Also included are the Rules Applicable to Classifications and Water Quality Standards adopted by the North Carolina Board of Water and Air Resources. Discussion at this hearing concerned the classification of streams in the Yadkin-Pee Dee River Basin, the Lumber River Basin, and the Cape Fear River Basin. (Craig-Florida)
W74-09276

PRINCIPLES AND STANDARDS FOR PLANNING WATER AND RELATED LAND RESOURCES.
Water Resources Council, Washington, D.C.
38 Fed. Reg. 24778 (1973), 192p.

Descriptors: *Water resources development, *Watershed management, *Water quality control, *Water pollution control, *Water supply, Standards, Land resources, Water resources, Water demand, Water conservation, Long-term planning, Water quality, Water policy, Environmental effects, United States.

The Water Resources Council announces the establishment of Principles and Standards for Planning Water and Related Land Resources, pursuant to section 103 of the Water Resources Planning Act (P.L. 89-80). Several areas of revisions from the original Principles and Standards are set forth. These include planning objectives, the discount rate, retroactive application of the 'Grandfather Clause,' cost allocation, public participation and water quality evaluation. Further areas of revision include the use of economic projections, unemployed and under employed resources, the application of benefit to cost ratio, the preparing of feasible project alternatives, and the impact of benefits on income distribution. The Principles, Standards, and Procedures are discussed individually, analyzing each area's purpose and scope, objectives, beneficial and adverse impacts, general evaluation principles, its plan formulation, cost allocation, reimbursement and cost sharing, implementation procedure and its application and effect. The Standards cover almost every area of water and related land resources that have a major impact on society and were promulgated after extensive study and public response. The full texts of the Principles and Standards are published as a part of this notice. (See also W74-09279) (Sutton-Florida)
W74-09278

PRINCIPLES AND STANDARDS FOR PLANNING WATER AND RELATED LAND RESOURCES (FINAL ENVIRONMENTAL STATEMENT).
Water Resources Council, Washington, D.C.
Available from National Technical Information Service, Springfield, Va. 22151, as EIS-AA-73-1451-F. $3.00 in paper copy. September 4, 1973. 16p.

Descriptors: *Water resources development, *Water quality control, *Water supply, *Water conservation, *Water policy, United States, Legislation, Long-term planning, Discount rate, Cost allocation, Water resources, Land resources, Environmental effects, Water pollution control.

These Principles and Standards for Planning Water and Related Land Resources will supercede the present criteria, commonly known as Senate Document 97, 87th Congress 2nd session together with Supplement No. 1 (June 4, 1964), and the amendment of December 24, 1968, covering the discount rate. The Principles and Standards will be directed toward two objectives: national economic development and environmental quality. For each alternative plan, there will be a complete display or accounting of relevant beneficial and adverse effects on both objectives. These effects would be measured in monetary or quantitative units or terms appropriate to a particular effect. Also, for each alternative plan the effects on regional development and social well-being will be displayed where appropriate in the system of public information accounts. This system of accounts is summarized and the planning process is outlined. Cost allocation and reimbursement and program development are summarized. The evaluation process is set forth, and will provide for full display of all environmental impacts, favorable and adverse, as well as all irretrievable commitments of resources. (See also W74-09278) (Sutton-Florida)
W74-09279

REPLACEMENT OF THE AMERICAN FALLS DAM IN IDAHO, PART 1.
For primary bibliographic entry see Field 6E.
W74-09309

ANALYSIS OF THE RUN-OFF AND FLOW ROUTING FOR A MOUNTAIN GLACIER BASIN,
Moscow State Univ., (USSR).
For primary bibliographic entry see Field 2C.
W74-09328

WATER MOVEMENT THROUGH THE GORNERGLETSCHER,
Hull Univ., (England). Dept. of Geography.
For primary bibliographic entry see Field 2C.
W74-09329

RECORD OF TWO JOKULLHLAUPS,
British Columbia Univ., Vancouver. Dept. of Geology.
For primary bibliographic entry see Field 2C.
W74-09331

SUBGLACIAL LEAKAGE OF SUMMIT LAKE, BRITISH COLUMBIA, BY DYE DETERMINATIONS,
Department of the Environment, Ottawa (Ontario). Inland Water Branch.
For primary bibliographic entry see Field 2C.
W74-09332

SOME VIEWPOINTS ON THE INTERNAL DRAINAGE OF GLACIERS,
Uppsala Univ. (Sweden). Dept. of Physical Geography.
For primary bibliographic entry see Field 2C.
W74-09333

INFLUENCE OF CHANGES IN THE GLACIERZED AREA ON SUMMER RUN-OFF IN THE PORTE DU SCEX DRAINAGE BASIN OF THE RHONE,
Eidgenoessfische Technishe Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau und Erdbau.
For primary bibliographic entry see Field 2C.
W74-09344

ESTIMATION OF RUN-OFF FROM ANTARCTIC AND GREENLAND ICE SHEETS,
Akademiya Nauk SSSR, Moscow. Vsesoyuznyi Institut Nauchnoi i Teknicheskoi Informatsii.
For primary bibliographic entry see Field 2C.
W74-09348

FLOOD PLAIN INFORMATION: OHIO RIVER, BROOKE COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Brooke County Planning Commission and the State of West Virginia, Department of Natural Resources, December 1971. 25 p, 14 fig, 6 tab, glossary.

Descriptors: *Flood plains, *Flood control, *Ohio River, Flood damage, *Flood profiles, Flood protection, *Flood frequency, Flood data, Locks, Dams, Gaging, Flood forecasting, Obstructions to flow, *West Virginia.
Identifiers: Brooke County(W. Va), Intermediate Regional Flood, Pike Island Locks and Dam(W. Va).

Brooke County is situated on the east bank of the Ohio River from Mile 64.75 to Mile 81.50 downstream of Pittsburgh, Pennsylvania. Wellsburg and Follansbee are the major towns with steel, sheet metal, tin, plate, coal, glass and plastic as principal industries. The Ohio River has a total drainage area of 203,940 square miles. Residences and industries have been built in the floodplain over the decades undeterred by recurring floods. Above Brooke County the Ohio River has a moderately wide floodplain and a relatively flat river gradient (a slope of 0.5 foot per mile for the report reach). In Brooke County there are no tributaries that have a significant effect on flood stages. Gage records have been kept from 1911 to the present. The main flood season is usually December through April. Flood duration is relatively long. The major obstruction to flood flows is the Pike Island Locks and Dam, which is equipped with gates allowing underpassage of flow. Fourteen upstream flood control projects operated by the Corps of Engineers are effective in reducing flood levels from 6 to 9 feet. No floodplain regulations or flood proofing building codes are now in effect in Brooke County. The most serious recorded flood for this area occurred on March 19, 1936, after 2 days for heavy rains. Wellsburg, suffering the greatest loss in Brooke County, was approximately three-fourths under water. Approximately one-fourth of Follansbee was flooded. A flood of only slightly lesser gravity came on December 31, 1942. Flood control dams prevented this disaster from surpassing the 1936 flood. On March 11, 1964 another major flood occurred. A projected Intermediate Regional Flood would have a peak discharge of 394,000 cubic feet per second with damage estimated at $6,000,000. (LaPointe-North Carolina)
W74-09354

FLOOD PLAIN INFORMATION; POCOTALIGO RIVER-TURKEY CREEK-CANE SAVANNAH CREEK-GREEN SWAMP-SHOT POUCH CREEK-ROCK BLUFF SWAMP, SUMTER COUNTY, SOUTH CAROLINA.
Army Engineer District, Charleston, S.C.
August 1972. 31 p, 57 fig, 7 tab, glossary.

Descriptors: *Flood data, *Design flood, *Regional flood, Flood profiles, Flood damage, Peak discharge, Flood forecasting, Historic floods, Overflow, Flood profiles, Floodwater, *South Carolina.
Identifiers: Pocotaligo River(S.C.), Turkey Creek(S.C.), Cane Savannah Creek(S.C.), Green Swamp(S.C.), Shot Pouch Creek(S.C.), Rocky Bluff Swamp(S.C.), Sumter County(S.C.).

While properties along Pocotaligo River, Turkey Creek, Cane Savannah Creek, Green Swamp, Shot Pouch Creek, and Rocky Bluff Swamp vary from concentrated residential and commercial development to heavily wooded swampland, most of the floodplain is presently undeveloped. Areas which would be flooded by Intermediate Regional and Standard Project Floods are delineated on maps. During an Intermediate Regional Flood, peak flows along selected points range from 9,700 to 11,000 cfs on Pocotaligo River; from 4,940 to 6,500 cfs on Cane Savannah Creek; from 3,000 to 5,200 cfs on Green Swamp; from 5,170 to 5,340 on Rocky Bluff Swamp; from 1,300 to 3,820 on Turkey Creek; and from 1,680 to 2,965 on Shot Pouch Creek. During a Standard Project Flood, peak flows along selected points range from 16,050 to 18,000 cfs on Pocotaligo Creek; from 8,450 to 11,100 cfs on Cane Savannah Creek; from 5,120 to 8,900 cfs on Green Swamp; from 8,870 to 9,130 cfs on Rocky Bluff Swamp; from 2,070 to 6,000 cfs on Turkey Creek; and from 2,870 to 5,000 cfs on Shot Pouch Creek. Water velocity patterns are similar for all streams with channel velocities varying from 1 to 3 feet per second and overbank velocities rarely exceeding 2 feet per second. Pertinent structural elevations and water surface elevations are given for each of the 36 bridges and culverts that span the six streams. Water surface profiles of the Intermediate Regional and Standard Project Floods are also included. (Hoffman-North Carolina)
W74-09355

FLOOD PLAIN INFORMATION; WILKESBORO AND NORTH WILKESBORO, NORTH CAROLINA; YADKIN RIVER AND REDDIE RIVER.
Army Engineer District, Charleston, S.C.
January 1971. 51 p, 27 fig, 10 tab, glossary.

Descriptors: *Flood data, Flood profiles, *Design flood, *Regional flood, *Flow control, *Flood control, Flood damage, Flood forecasting, Historic floods, Overflow, Floodwater, Peak discharge, Dams, *North Carolina.
Identifiers: Yadkin River(N.C.), Reddie River(N.C.), W. Kerr Scott Dam(N.C.), Reddie River Dam(N.C.), Wilkesboro(N.C.).

Above Wilkesboro and North Wilkesboro, the Yadkin River drains an area of 493 square miles, including the 96 square mile drainage basin of the Reddies River. W. Kerr Scott Dam, located on the Yadkin River 5.5 miles above Wilkesboro, controls the runoff from 348 square miles. The Reddies River, presently uncontrolled, is capable of producing a serious flood. Congress has authorized a multi-purpose project for the Reddies River basin. Under proposed future conditions, W. Kerr Scott Dam and the Reddies River Dam will both fully control the Intermediate Regional Flood at their respective sites. An Intermediate Regional Flood could result from rainfall concentrated over the 50.5 square mile drainage area between Wilkesboro and the two damsites. Neither dam could fully control a Standard Project Flood: W. Kerr Scott Dam would allow a peak outflow of 29,000 cfs and the Reddies River Dam would allow a peak outflow of 10,500 cfs. Under existing conditions peak discharges during an Intermediate Regional Flood would be 61,500 cfs on the Yadkin River and 36,200 cfs on the Reddies River. An Intermediate Regional Flood would flood 1,294 acres, including 250 structures along the Yadkin River and 95 acres, including 19 structures, along the Reddies River. A Standard Project Flood would flood 1,673 acres, including 368 structures, along the Yadkin River and 180 acres, including 33 structures, along the Reddies River. Regulation by the Reddies River project would reduce the respective areas of coverage by approximately 14%. Water surface profiles under existing conditions and with regulation by the proposed Reddies River Dam are included. (Hoffman-North Carolina)
W74-09356

FLOOD PLAIN INFORMATION; KIT AND NORTHEAST CREEKS; RESEARCH TRIANGLE AREA, DURHAM AND WAKE COUNTIES, NORTH CAROLINA.
Army Engineer District, Wilmington, N.C.
June 1973. 20 p, 10 fig, 15 plates, 5 tab, glossary.

Descriptors: *Flood data, *Design flood, *Regional flood, Flood damage, Peak discharge, Flood forecasting, Overflow, Flood profiles, Floodwater, *North Carolina.
Identifiers: Kit Creek(NC), Northeast Creek(NC), Research Triangle Area(NC).

The Research Triangle Area, a 5,000 acre tract located between the University of North Carolina at Chapel Hill, North Carolina State University at Raleigh, and Duke University in Durham, is being developed for industrial and governmental research and development facilities. At present with 5% of the land developed, 75% woodland, and 20% agricultural, only highway bridges and a few buildings would be affected by flooding. Since no flood discharge or stage records are available for Kit or Northeast Creeks, flood potential was extrapolated from data on regions of like topography and watershed cover. Total drainage area of Northeast Creek and North Prong, a tributary, is approximately 34 square miles; total drainage area for Kit Creek, 10.2 square miles. Development in the lower reach is precluded by present construction of New Hope Lake Project. As the Triangle expands the flood plain will come under increasing pressure for commercial development. A Standard Project Flood would flood 1,029 acres, including 13 structures along Northeast Creek, 110 acres, including 5 structures along North Prong Northeast Creek and 426 acres along Kit Creek and Branch South. An Intermediate Regional Flood would flood 813 acres, including 4 structures along Northeast Creek, 82 acres, including 1 structure along North Prong Northeast Creek, and 328 acres along Kit Creek and Branch South. Underclearance elevation, lowest elevation of roadway, and water surface elevation during Intermediate Regional Floods and Standard Project Floods are detailed for all bridges and culverts. Photographs indicate possible levels of future flooding. (Hoffman-North Carolina)
W74-09357

FLOOD PLAIN INFORMATION; REEDY RIVER, RICHLAND CREEK, GREENVILLE COUNTY, SOUTH CAROLINA.
Army Engineer District, Charleston, S.C.
April 1972. 42 p, 20 fig, 28 plates, 7 tab, glossary.

Descriptors: *Flood data, *Design flood, *Regional flood, *Flood profiles, Flood damage, Peak discharge, Flood forecasting, Overflow, Floodwater, Historic floods, *South Carolina.
Identifiers: Reedy River(SC), Richland Creek(SC), Greenville County(SC).

Properties along Reedy River and Richland Creek vary from intense urban development in downtown Greenville, where past floods have caused considerable damage to homes and industries, to woodland and pastureland in the reaches north and south of town. It is expected that future urban expansion will increase development on the floodplain, thus magnifying the effect of flooding. Reedy River and Richland Creek generally rise swiftly during floods and remain out of their banks for at least 24 hours. Velocities of main channel flow would vary from 3 to 9 feet per second during an Intermediate Regional Flood, with velocity of flow slightly higher during a Standard Project Flood. Peak flows along selected points on Reedy River range from 3,300 to 13,000 cfs during an Intermediate Regional Flood and from 7,500 to 27,300 cfs during a Standard Project Flood. Peak flows along selected points on Richland Creek range from 2,380 to 3,500 cfs during an Intermediate Regional Flood and from 5,440 to 8,000 cfs during a Standard Project Flood. Underclearance elevation, lowest elevation of roadway, and water surface elevation during Intermediate Regional and Standard Project Floods are detailed for the 49 bridges and culverts that span the two streams. Overflow areas are delineated on maps. Water surface profiles of Intermediate Regional and Standard Project Floods are also included. (Hoffman-North Carolina)
W74-09358

GENERAL PLAN FOR RECOMMENDED STORM DRAINAGE FACILITIES, MARION COUNTY, OHIO.
Brown (Floyd G.) and Associates, Ltd., Marion, Ohio.
For primary bibliographic entry see Field 5D.
W74-09359

ENVIRONMENTAL CONSIDERATIONS FOR WATER MANAGEMENT DISTRICT 6 OF COLLIER COUNTY,
Collier County Conservancy, Inc., Naples, Fla.
For primary bibliographic entry see Field 6B.
W74-09360

RAIN FLOOD DISCHARGE IN NORTHEASTERN SLOPES OF KOPET-DAG (USSR), (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
B. T. Kirsta.
Probl Osvoeniya Pustyn'. 2. p 32-38, 1973, Illus, English summary.
Identifiers: *Flood discharge, Irrigation, Permeability, Rain floods, Slopes, Soils, *USSR(Kopet-Dag), Water sources.

The number of floods varies from 1-15/yr. They occur annually in drainage systems consisting of soil very impermeable to water. It is more advantageous to use flood waters for replenishment of underground water resources. Therefore stable irrigation of vast areas is lacking.--Copyright 1974, Biological Abstracts, Inc.
W74-09365

PROGRESS REPORT ON THE EFFECT OF GROUND-WATER CONDITIONS ON LOCAL FLOODING IN THE KINGSTON AREA, PA.,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-09366

THE COOPER RIVER ENVIRONMENTAL STUDY.
For primary bibliographic entry see Field 2L.
W74-09379

VASCULAR PLANT SURVEY OF MARSH AND ADJACENT HIGHLAND IN SELECTED PORTIONS OF COOPER RIVER AND WANDO RIVER,
South Carolina Univ., Columbia.
For primary bibliographic entry see Field 2L.
W74-09382

THE VEGETATION OF THE COOPER RIVER ESTUARY,
South Carolina Univ., Columbia.
For primary bibliographic entry see Field 2L.
W74-09383

WATER QUALITY PORTION OF THE COOPER RIVER ENVIRONMENTAL STUDY.
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5B.
W74-09385

SURFACE WATER HYDRAULICS.
For primary bibliographic entry see Field 2L.
W74-09387

HIGHWAYS AND THE CATASTROPHIC FLOODS OF 1972.
Highway Research Board, Washington, D.C.
For primary bibliographic entry see Field 2E.
W74-09390

FLOODS OF 1972,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2E.
W74-09391

WEATHER SITUATIONS ASSOCIATED WITH FLOODS DURING 1972,
National Weather Service, Silver Spring, Md.
For primary bibliographic entry see Field 2E.
W74-09392

HURRICANE AGNES-DAMAGE IN PENNSYLVANIA,
Pennsylvania State Dept. of Transportation, Harrisburg.
For primary bibliographic entry see Field 2E.
W74-09393

FLOOD DAMAGE IN SOUTH DAKOTA,
South Dakota State Dept. of Highways, Pierre.
For primary bibliographic entry see Field 2E.
W74-09394

FLOODS IN MINNESOTA,
Minnesota State Highway Dept., Minneapolis.
For primary bibliographic entry see Field 2E.
W74-09395

OBSERVATIONS ON THE CAUSES OF BRIDGE DAMAGE IN PENNSYLVANIA AND NEW YORK DUE TO HURRICANE AGNES,
Federal Highway Administration, Washington, D.C. Office of Engineering and Traffic Operations.
For primary bibliographic entry see Field 2E.
W74-09396

RECORDING FLOODS AND FLOOD DAMAGE,
Geological Survey, Reston Va.
W. Hofmann.
Highway Research Record, No 479, p 40-41, 1973.

Descriptors: *Flood data, *Data collections, *Hydrologic data, Basic data collections, Floods, Peak discharge, Stream gages, Surveys, State-discharge relations, Flood frequency, Flood recurrence interval.

The Geological Survey has the responsibility for recording the state, discharge, and areal extent of floods. Major floods are documented by collecting data in the field and then by reporting the data so that they are available to those who need the information. The areal extent of the flooding is delineated through field surveys and photogrametrically. At gauge sites, continuous water stages and periodic discharge measurements are collected. (See also W74-09390) (Knapp-USGS)
W74-09397

PROBABILITY DISTRIBUTION OF EXTREME FLOODS,
Geological Survey, Reston, Va.
C. H. Hardison.
Highway Research Record, No 479, p 42-45, 1973. 2 fig, 1 tab, 2 ref.

Descriptors: *Floods, *Probability, *Historic floods, *Flood frequency, *Flood recurrence interval, Statistics, Statistical methods, Flood data, Flood forecasting, Frequency analysis.

Two aspects of the unusually large floods experienced in 1972 are discussed: how such large floods affect the computation of the 50-year peak and how these floods plot on a probability distribution of extreme floods based on analysis of 157,000 annual peaks at about 200 stream gauging stations. Weight factors are given to be used in computing 50-year peaks both with and without extreme floods included. For 10 of the stations affected by the 1972 floods associated with Hurricane Agnes, the use of the recommended Log-Pearson Type III (LPT3) procedure with observed peaks through 1972 results in 50-year peaks that average three times as large as the 50-year peaks computed without including the Agnes floods. Even when generalized logarithmic skew coefficients were substituted for the sample skew coefficients in the LPT3 computations, the 50-year peaks at these 10 stations averaged about 80 percent larger with the Agnes floods than they did without. When an annually high flood is included in an array of flood peaks, computation of the 50-year peak by the LPT3 procedure should use a generalized skew coefficient and considerable weight should be given to the 50-year peak computed with the highest peak deleted from the array. Extension above the 50-year peak should be a straight line on log probability paper to about the 1,000-year probability level, but the slope should be based in part on the average slope at all stations in the area. Floods that are more than two standardized units above the 50-year peak are so rare that their exceedance probability (less than one in 4,000) is comparable to that for damage caused by other natural disasters such as earthquakes, landslides, and tornadoes. (See also W74-09390) (Knapp-USGS)
W74-09398

DESIGN CRITERIA AND RESEARCH NEEDS,
Hydrologic Engineering Center, Washington, D.C.
V. Hagen, W. Hofmann, F. L. Johnson, S. V. Fox, and B. M. Reich.
Highway Research Record, No 479, p 54-64, 1973. 2 fig.

Descriptors: *Design flood, *Flood forecasting, *Bridges, *Highways, Roads, Disasters, Risks, Design, Planning.

The occurrence of an extreme flood event, such as Hurricane Agnes, requires careful review of flood prevention activities. Flood events in excess of the design flood will occur somewhere each year. It is not possible, because of money constraints, to build all structures to pass the biggest flood that might happen in that location. So, the only answer appears to be to build highways so that extensive damage will not occur, either to the highway or to other property. (See also W74-09390) (Knapp-USGS)
W74-09400

ENVIRONMENTAL STATUS OF THE LAKE MICHIGAN REGION: VOLUME 7. EARTHQUAKE HISTORY AND MEASUREMENT WITH APPLICATION TO THE LAKE MICHIGAN DRAINAGE BASIN,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 2H.
W74-09407

THE EFFECTS OF LAND USE ON SALMON PRODUCTION,
Alaska State Dept. of Fish and Game, Juneau.
For primary bibliographic entry see Field 4C.
W74-09411

ENVIRONMENT: A NEW FOCUS FOR LAND-USE PLANNING.
National Science Foundation, Washington, D.C.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price $2.95. Report NSF/RA/E-74-001, October 1973, 328 p (Edited by Donald M. McAllister).

Descriptors: *Land use, *Urbanization, *Environment, *Comprehensive planning, Suburban area, *Research priorities, *Land management, Economics, Evaluation, Governmental interrelations, Institutions.

This book is divided into four parts. Part I presents the recommendations of high-priority research for land-use planning and allocation that were developed by the workshop participants. Part II contains an introductory chapter and historical overview of land-use planning in the United States. Part III comprises a collection of nine papers devoted to various topics concerning the social, economic, and natural environmental factors important to environmental/land-use planning. They were prepared in advance of the conference to serve as background papers for the work at the conference. Part IV contains six committee reports which were prepared during the conference. (See W74-09413 thru W74-09421)
W74-09412

THE FUTURE OF THE URBAN HABITAT,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6E.
W74-09413

LAND-USE INSTITUTIONS IN THE WASHINGTON-BALTIMORE REGION-A MIRROR FOR METROPOLITAN AMERICA,
Carnegie Institution of Washington, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-09414

LAND-USE RESEARCH ISSUES SUGGESTED BY A NATIONAL URBAN GROWTH STRATEGY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Urban Studies and Planning.
L. Rodwin, and L. Susskind.
In: Environment: A New Focus for Land Use Planning, National Science Foundation, Washington, D.C., Report NSF/RA/E-74-001, p 127-142, October 1973. 24 ref.

Descriptors: *Urbanization, *Land use, *Planning, *Research priorities, *Federal government, Coordination, State government, Local government, City planning, Management.
Identifiers: Urban growth strategy, Metropolitan decentralization.

Federal inactivity in developing a national growth policy has left a severe vacuum in attempts to organize metropolitan growth, to develop lagging regions, and to establish ethnic autonomy. State and local governments, however, have had and will continue to have a major role in implementing a national urban growth strategy. Certain research implications merge from such a strategy. First, what kind of incentives and on what scale can they be established to produce significant effects in metropolitan growth. Second, can a few growth centers be established to focus new regional development, and can assistance be provided for the populations of regions where development is infeasible. Thirdly, since racial and ethnic considerations will become a major factor in land use planning, what new characteristics and options must be considered. Concrete research problems include the assessment of the impact of urban growth strategies, linking decentralization of major urban areas to the promotion of lagging regions, the use of the new town device as a reinforcement of urban growth centers, and employing the powers of state governments to implement urban growth strategies and to address environmental concerns. There is a pressing need for a coordinated set of national policies so that lower level, day to day, administrative decisions can be justified by a meaningful set of principles. (See also W74-09412) (LaPointe-North Carolina)
W74-09415

CONFLICTS IN LAND USE,
Ross, Hardie, O'Keefe, Babcock, McDugald and Parsons, Chicago, Ill.
In: Environment: A New Focus for Land Use Planning, National Science Foundation, Washington, D.C., Report NSF/RA/E-74-001, p 143-155, October, 1973.

Descriptors: *Legal aspects, *Land use, *Land development, *Research priorities, Zoning, Local governments, Equitable apportionment, Benefits, Costs, Migration, Administration.
Identifiers: No-growth policies, Housing, Urban design, Miami Valley Region(Ohio), Boulder(Colo.), San Bernadino(Calif.), Ramapo(N.Y.).

Most debates over public policy on land use involve relationships between three parties: (1) the owner of the land; (2) the local government directly concerned over the development of the land; (3) those interests which may be affected by decisions made by either of the first two parties. Useful legal solutions need to be developed that would redistribute benefits and liabilities between public expenditures and private development of land. Legalization of urban design is also a problem. Public decision makers are faced with a system of land-use regulation based upon Euclidean zoning employing rigid rules for lot size criticized as encouraging sterile design, or Planned Unit Development allowing greater flexibility in design. Additional legal techniques of land-use regulation need to be developed to provide alternatives to static solutions possible through zoning and encourage more diversity of housing, commercial uses, and population mix. The Miami Valley Region (Ohio) and San Bernardino Region are areas that have tackled the problem of distributing the burden of low cost housing among all constituent communities. Communities like Boulder, Colo. and Ramapo, N.Y., that have established no growth policies will need to consider whether they can achieve ecological goals and simultaneously provide needed low cost housing and related services. Consideration must also be given to whether planning and implementation at the regional or state level is impaired. Future conflicts may arise

out of the present policy of open migration, construction of megastructures, and concepts of the family where the modular of the traditional family unit may be replaced by communal living or other forms of relationships. (See also W74-09412) (LaPointe-North Carolina)
W74-09416

ECONOMIC POLICIES, ENVIRONMENTAL PROBLEMS, AND LAND USE,
California Univ., Riverside.
For primary bibliographic entry see Field 6B.
W74-09417

AN EVALUATION OF THE IMPACT OF LAND USE ON ENVIRONMENTAL QUALITY,
Argonne National Lab., Ill. Center for Environmental Studies.
E. J. Croke.
In: Environment: A New Focus for Land Use Planning, National Science Foundation, Washington, D.C., Report NSF/RA/E-74-001, p 217-231, October, 1973. 1 tab, 14 ref.

Descriptors: *Land use, *Evaluation, *Environment, *Planning, Air pollution, Water pollution, Clean Air Act, Federal Water Pollution Control Act, Land development, Standards, River basin development, Federal jurisdiction, Institutions, Regional development.
Identifiers: Assimilative capacity, National standards.

Recent federal legislation such as the Federal Clean Air Act (1970) and the Water Pollution Control Act have mandated pollution control plans reflecting the spatial distribution of pollutant sources for metropolitan regions and river basins. Such plans would necessitate the substitution of a comprehensive land use policy for the present technologically oriented pollution control strategy which is seriously hampered by rapid development. Any environmental land use policy would have to consider the relationship between the assimilative capacity of an area and environmental quality standards. For example, large quantities of toxic industrial wastes may be contaminating New Jersey groundwater due to an inability to assimilate the wastes. Lake Tahoe and Atlanta are cited as two areas where regional development plans have included constraints due to assimilative capacity. Current national environmental strategy, however, tends to disregard the particular assimilative capacities of different areas by establishing national emission and environmental quality standards. Current land development policy, with projects having a 25-30 year economic lifetime can often lead to socioeconomic irreversibility of the consequent environmental problems. Highway systems, airports, and the land development and population distribution they engender are cases in point. In order to insure the inclusion of environmental control in land use decisions by states and localities the federal government has a wide variety of incentives and disincentives at its disposal including the withholding of granting of funds for transportation systems, water treatment facilities and energy distribution systems. (See also W74-09412) (LaPointe-North Carolina)
W74-09419

PLANNING FOR AREAS OF SIGNIFICANT ENVIRONMENTAL AND AMENITY VALUE,
California Univ., Berkeley. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 6B.
W74-09420

UNIVERSITY RESEARCH AND PRACTICE: AN INSTITUTIONAL CONFRONTATION,
California Univ., Los Angeles. School of Architecture and Urban Planning.
For primary bibliographic entry see Field 6E.
W74-09421

MANAGEMENT OF LANDS USED FOR WASTE DISPOSAL,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 5D.
W74-09424

FULL-SCALE HARVEST OF AQUATIC PLANTS: NUTRIENT REMOVAL FROM A EUTROPHIC LAKE,
North Dakota Univ., Grand Forks. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W74-09438

THE EFFECTS OF WATER FLOW MANIPULATION BELOW THE HYDROELECTRIC POWER DAM ON THE BOTTOM FAUNA OF THE UPPER KENNEBEC RIVER, MAINE,
Maine Cooperative Fishery Unit, Orono.
For primary bibliographic entry see Field 5C.
W74-09462

WATER PROBLEMS IN THE ARID WESTERN REGIONS OF THE USA, (IN RUSSIAN),
I. S. Zonn.
Probl Osvoeniya Pustyn'. 2. p 39-48. 1973. Illus. English summary.
Identifiers: Agriculture, *Arid lands, Cloud seeding, Ground water depletion, Irrigation, *Water utilization, *Western U.S., Desalination, Saline water, Thermal water, Inter-basin transfer.

In the western USA the available water resources are utilized completely, and in arid regions lack of water is considerable. Ground water is depleted primarily by agricultural irrigation. Investigations are under way to enable more economical use of the available water resources (cloud seeding, desalinization of saline underground and sea waters, utilization of thermal waters, and intra- and inter-basin water transference.)--Copyright 1974, Biological Abstracts, Inc.
W74-09469

ANALYTICAL MODEL FOR MANAGEMENT OF ALLUVIAL AQUIFERS,
Colorado Dept. of Natural Resources, Denver. Div. of Water Resources, Planning and Investigations.
For primary bibliographic entry see Field 4B.
W74-09477

USE OF DECISION THEORY IN RESERVOIR OPERATION,
British Columbia Univ., Vancouver. Dept. of Civil Engineering.
S. O. Russell.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY6, Paper No 10586, p 809-817, June 1974. 3 fig, 6 ref.

Descriptors: *Canada, *Demand, *Forecasting, Hydraulics, *Multiple-purpose reservoirs, *Reservoir operation, Methodology, Lakes, Flow, Snowmelt, Runoff, Discharge(Water), Water levels, Flood control, Storage, Irrigation water, Water supply, Systems analysis, Mathematical models, *Risks.
Identifiers: Rule curves, *Decision theory, Bayes' theorem, Subjective probability, Okanagan Lake(British Columbia-Canada), Utility curve, Decision tree.

A method is presented for deciding how to most efficiently operate a multipurpose reservoir which is subject to conflicting demands. The method is based on decision theory and can be used to derive reservoir rule curves when flow forecasts are unavailable or to provide guidance in real time on what is best to do when forecast information is available. Because of the complexity of the real situation, the Bayes' theorem cannot be applied formally--decision theory cannot be applied directly. However, the underlying approach is believed to be 'Bayesian' in that it uses subjective probability estimates of future inflows obtained from the hydrologist, a utility curve obtained from the decision maker, and it seeks to maximize expected utility at all times. A special bridge between theory and practice has been devised. The procedure is illustrated by application to the Okanagan Lake in British Columbia, a lake which is operated as a reservoir for both flood control and storage of water for irrigation purposes. The method does not eliminate the need for experience and judgement on the operator's part, but be making the process explicit it should help the decision maker in using all the available information in a rational and consistent way. (Bell-Cornell)
W74-09478

WATER AND LAND SLIDES,
Paul Sabatier Univ., Toulouse (France). Lab. of Botany and Biogeography.
M. M. Lorilland.
Bull Soc Hist Nat Toulouse. Vol 108, No 1/2, p 248-254, 1972. Illus.
Identifiers: Climates, *France(Garonne-Ariege rivers), *Land slides, Maintenance, Rocks, Soils, Stream, Vegetation.

Observations and experimentation on land slides in the vicinity of the Garonne and Ariege Rivers were carried out at Toulouse-Pouvourville, Vieille-Toulouse, Portet-sur-Garonne, Lacroix-Falgarde and Goyrans, France. Related factors include terrain, geological, topographical, pedological and climatic conditions. The rock of the region is of the Marn-Molasse type, with intercalated veins and lentils of clay and sand. The veins and sandy lentils permit infiltration and subterranean circulation of waters arising from stream action, which diminishes the resistance of the rock to unfavorable forces. A talus at the foot of the hill, which is often directly bathed by river water, is an outlier of slide phenomena. The main climatological concerns are conditions of excessive winter and spring rains, which affect pedological conditions, and are the essential determining agent in slides; and summer drought which does not eliminate the instability created by the precipitation, and which harms protective vegetation. Studies carried out in 1959-1969 revealed a relationship between slides and the amount of precipitation of the preceding months. Most slides occurred at the end of spring, after accumulation of winter and spring rains. Slides occurring in late autumn or early winter are more easily explained on the basis of the imbibement of high river waters. Swollen rivers due to melting mountain snow in the spring are undoubtedly an important factor in slide production. Topographical factors (maintenance of the natural vegetation cover) are also important.--Copyright 1974, Biological Abstracts, Inc.
W74-09485

EXPERIMENTAL FIELD STUDIES REQUIRED FOR THE DESIGN OF DRAINAGES, (STUDII EXPERIMENTALE IN TEREN, NECESARE PROIECTARII DRENAJELOR),
A. Wehry.
Hidrotehnica, Vol 18, No 11, p 586-589, November, 1973. 2 ref.

Descriptors: Engineering structures, *Drainage systems, *Drainage engineering, Irrigation ditches, Lateral conveyance structurs, Model studies, *Mathematical studies.
Identifiers: *Hooghoudt's method, *Ernst's method.

Calculation methods necessary for conducting experimental field studies before designing drainage systems are presented. Presented are views of the drainage structures, pressure loss representation, the nomogram for calculating the value according to Hooghoudt, the ground water level representation during and after irrigation and the experimen-

tal value H=f(t) representation. In order to calculate the distance between drains, Hooghoudt and Ernst's methods are most often used. In order to apply the nomograms, it is necessary to know hydraulic conductivity of the earth layer. This value can be obtained only by a field study. Also, porosity and drainage intensity must be known. Equations are provided for various field situations and examples of calculations are given. (Urbanski - FIRL)
W74-09495

RAIN RESERVOIRS AND RAIN OVERFLOWS (REGENBECKEN UND REGENENTLASTUNGEN),
W. Muntz.
Gas-Wasser-Abwasser, Vol 53, No 9, p 293-300, September, 1973. 7 fig, 1 tab, 7 ref.

Descriptors: *Rainfall-runoff relationships, *Rainfall intensity, Rain, Rates, Runoff, Sewers, *Watersheds(Basins), Canals, Treatment, *Waste water treatment.

Problems of the design and dimensioning of rain reservoirs and rain overflows are discussed. Canal overflows without rain reservoirs serve to release stormwater directly into the recipient whenever a critical throughflow is reached. Rain overflow basins bypassing the wastewater treatment facility assume a similar role, while rain overflow basins connected in series with the wastewater treatment facility serve to protect the latter to preserve its purifying capacity. Rainwater retention basins retain stormwater for subsequent treatment. While most stormwater overflow basins are currently designed for a minimum critical rain intensity of 15 liter/sec, this critical value should be now increased to 25-30 liter/sec, and even to 40-50 liter/sec for especially protected recipients and for water capture areas. Rain reservoirs should be designed for flow times of 5 to 15 minutes. Increased flow time results in increased reservoir volume per ha, and in reduced final pollutant concentration. Attenuation of the initial pollutant load peak in watershed areas was determined. (Takacs-FIRL)
W74-09509

BETTER STORM DRAINAGE FACILITIES--AT LOWER COST,
For primary bibliographic entry see Field 5D.
W74-09513

ALUMINUM PIT DOORS PROVIDE EASY ACCESS TO A RETENTION BASIN.
For primary bibliographic entry see Field 5D.
W74-09515

MANAGING WATER RESOURCES FROM THE WRONG PLACE AT THE WRONG TIME,
California State Dept. of Water Resources, Sacramento. Div. of Resources Development.
For primary bibliographic entry see Field 6B.
W74-09528

PREVENTING LANDFILL LEACHATE CONTAMINATION OF WATER,
Gulf South Research Inst., Baton Rouge, La.
For primary bibliographic entry see Field 5G.
W74-09539

THE INFLUENCE OF DRAW-DOWN ON RECREATION ON THE TRENT CANAL RESERVOIR-LAKES,
Toronto Univ. (Ontario). Faculty of Forestry.
R. Jaakson.
Water Resources Bulletin, Vol 9, No 6, p 1225-1233, 1973. 4 ref.

Descriptors: *Water level fluctuations, *Duty of water, *Recreation, *Jurisdiction, *Drawdown, Effects, Attitudes, Reservoirs, Competing uses, Legal aspects, Political aspects, Canals, Planning, Multiple-purpose projects, Decision making, Water utilization, Water rights, Riparian rights, Shores, *Canada.
Identifiers: *Trent Canal(Ontario).

The multiple purposes of many water related projects are often conflicting. The Trent Canal in Ontario, Canada, a 240-mile recreational waterway of canals, navigable lakes, and rivers, provides a unique opportunity to study two conflicting water uses, both involving recreational activities. The Canadian Federal government currently manages the 44 adjacent lake-reservoirs as water storage sites to augment the canal's flow. The major recreational users of the lakes are cottage owners while boaters are heavy consumers of recreational activity on the canal. Drawdowns, sometimes to the level of 13 feet, to maintain boating create negative externalities to cottage owners. Twelve of the 44 lakes were chosen as study sites with three water bodies outside the region used as controls. In depth interviews with 5% of cottage owners on the lakes--115--to examine the impact of drawdown were conducted. Results indicate that previously hypothesized values of the externalities were exaggerated, with drawdowns on infrequently dry years only likely to cause a significant impact. Owners were found to readily adapt to changes in water levels, thereby not leading to a severe curtailment of recreational activity. Shoreline physiography of cottage sites was shown to significantly affect owners' reaction to the drawdowns. (Schroeder-Wisconsin)
W74-09555

ECOLOGICAL RIVER BASIN MANAGEMENT,
National Parks and Conservation Association, Washington, D.C.
A. W. Smith.
The Environmental Journal, Vol 46, No 3, p 1-4, 1972.

Descriptors: *Ecology, *Environmental effects, Dams, Watershed management, Reservoirs, *River basin development, Irrigation, *Flood plain zoning.

The address by the President and General Counsel of the National Parks and Conservation Association presented before the 1971 Seventh American Water Resources Conference contends that the major objectives of water resources management, and specifically river basin management, as currently practiced by government agencies and regulated utilities in the United States are outmoded and destructive. The focus of criticism is the big dam and the concomitant reservoir, for over 75 years the basic tool in river basin management. The failure of this tool for irrigation, water supply, flood control, hydroelectric power, and pollution abatement programs is examined. Of even greater concern, in addition to the failure of the big dam and reservoir to achieve goals set by river basin planners, is the ecological damage created by these structures. Farm land is reduced by inundation, communities, homes, churches, cemeteries, and historical sites or buildings have been destroyed or forced to relocate. Alternatives to the big dam concept exist. Included in those discussed are flood plain zoning, small local reservoirs, and pollution abatement at the source. (Schroeder-Wisconsin)
W74-09559

SIMULATION CRITERIA FOR SELECTING WATER RESOURCE SYSTEM ALTERNATIVES,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 6A.
W74-09567

A GENERAL PURPOSE SIMULATION MODEL FOR ANALYSIS OF SURFACE WATER ALLOCATION USING LARGE TIME INCREMENTS,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 6A.
W74-09568

AN EXPERIMENTAL STUDY OF DRAINAGE BASIN EVOLUTION AND THE INFLUENCE OF LANDFORMS ON HYDROLOGIC VARIABLES,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
S. A. Schumm, and R. S. Parker.
Available from NTIS, Springield, Va. 22151 as AD-767 284, Price $2.75 printed copy; $1.45 microfiche. Final contract report to Army Research Office Report, September 1, 1973. 17 p, 2 fig, 2 tab. DA-ARO-D-31-124-70-G13.

Descriptors: *Geomorphology, *Model studies, *Hydraulic models, Erosion, Channel morphology, Topography, Rainfall-runoff relationships, Drainage patterns(Geologic), Sediment yield.

To study drainage evolution, a scale model was designed and constructed at Colorado State University during 1970. During two experimental seasons, (summer 1971, 1972) the evolutionary development of small drainage systems was documented by photography and mapping. The response of the drainage systems to baselevel change was recorded, and during the evolution of the systems, from inception of the drainage patterns, through maximum growth to eventual reduction of drainage density, hydrologic data were collected. These data have been related to the changing morphology of the evolving drainage system. (Knapp-USGS)
W74-09586

A GENERAL PURPOSE EVENT WATER-LEVEL RECORDER,
National Water and Soil Conservation Organization, Wellington (New Zealand).
For primary bibliographic entry see Field 7B.
W74-09604

GEOLOGY AND QUALITY OF WATER IN THE MODESTO-MERCED AREA, SAN JOAQUIN VALLEY, CALIFORNIA, WITH A BRIEF SECTION ON HYDROLOGY,
Geological Survey, Menlo Park, Calif.
R. W. Page, and G. O. Balding.
Geological Survey Water-Resources Investigations 6-73, September 1973. 85 p, 28 fig, 12 tab, 67 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater, *Water quality, *California, Geology, Hydrologic data, Hydrogeology, Aquifer characteristics, Water wells, Well data, Water yield, Streamflow, Geomorphology, Surface-groundwater relationships, Water utilization, Water supply, Irrigation, Chemical analysis.
Identifiers: *San Joaquin Valley(Calif), *Modesto-Merced area(Calif).

The Modesto-Merced area, California, includes about 1,800 square miles on the northeast side of the San Joaquin Valley. The physiographic units in the area are (1) Sierra Nevada, (2) dissected uplands, (3) low alluvial plains and fans, (4) river flood plains and channels, and (5) overflow lands. At least three groundwater bodies occur in the area: (1) the unconfined water body, (2) the confined water body, and (3) the water body in consolidated rocks. Groundwater in the unconfined water body generally is moderately hard east of U.S. Highway 99 and hard to very hard west of Highway 99. However, a corridor of moderately hard water is present west of U.S. Highway 99 along the Merced River. Water in the confined water body ranges from soft to very hard. Surface

water in the area differs in chemical quality because of differences in size and location of drainage basins, amounts of precipitation, types of rocks in drainage basins, spills from irrigation water and industrial and domestic development along a given river or stream. The few analyses of water from minor streams indicated that the water was of a bicarbonate type and that it was comparable to or better than that in the major rivers. Water from major rivers ranged in chemical type from calcium bicarbonate to sodium chloride. (Woodard-USGS)
W74-09605

RIVER REGULATIONS AS INFLUENCE ON PEAK DISCHARGE,
International Engineering Co., Inc., Denver, Colo.
Barton, Stoddard, Milhollin and Higgins Div.
A. F. Huggins, and M. R. Griek.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY7, Paper 10671, p 901-918, July 1974. 11 fig, 7 tab, 5 ref, 2 append.

Descriptors: *Peak discharge, *Regulation, *Flood control, *Reservoirs, *Colorado River, Colorado, Regulated flow, Diversion, Design flood.

River regulation materially affects the magnitude of peak flood discharge in a river basin. Peak flow in the upper Colorado River basin is primarily from snowmelt runoff. The first significant regulation occurred in 1936 with the inauguration of the Moffat Tunnel and in 1942 with the completion of Green Mountain Dam. Three analytical approaches were used to determine the amount of reduction in peak flow resulting from regulation. Utilizing river flow data during the years 1900-1968, a 50-yr flood flow of 31,000 cfs was computed whereas the series 1942-1968 yields 22,800 cfs, a 30% flow reduction, Regional analysis of adjacent watersheds indicated a 10% reduction attributed to climatic conditions. An analysis of tributaries in the basin indicated a 20% reduction in unit contribution resulting from controls. These approaches gave support for the recommendation of a design flow reduced 20% from the peak discharge computed over the longer period of record. (Knapp-USGS)
W74-09617

COMPARISON OF FOUR NUMERICAL METHODS FOR FLOOD ROUTING,
Hydraulics Research Station, Wallingford, (England).
For primary bibliographic entry see Field 2E.
W74-09621

OPTIMAL DESIGN FOR HIGHWAY DRAINAGE CULVERTS,
Meta Systems, Inc., Springfield, Va.
G. K. Young, M. R. Childrey, and R. E. Trent.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY7, Paper 10676, p 971-993, July 1974. 13 fig, 5 tab, 30 ref, 2 append.

Descriptors: *Design flow, *Culverts, Economics, *Virginia, Highways, Hydraulics, Risks, Probability, Hydraulic design.

Economic risks are directly considered in an optimal design procedure for box culverts. Flood related losses are computed on a probabilistic basis to derive economic risks for box culvert design. The components of the economic risk are damage to upstream property, damage to the embankment and roadway, and damage to the culvert. An optimal design is reached when the construction costs plus the economic risks are minimum. The design procedure was applied to 22 sites on stream crossings in Virginia. Based on this economic risk procedure, curves were developed which suggest variable return period criteria for conventional design practice. For the conventional situations, construction cost savings on the order of 50% are indicated for the reinforced concrete barrels of the optimal design. (Knapp-USGS)
W74-09630

GEOHYDROLOGY OF CROW CREEK AND LOWER BRULE INDIAN RESERVATIONS, SOUTH DAKOTA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-09638

ASSESSING VISUAL-CULTURAL VALUES OF INLAND WETLANDS IN MASSACHUSETTS,
Massachusetts Univ., Amherst. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 6B.
W74-09651

COMPUTER MODELING APPLICATIONS IN URBAN WATER PLANNING,
Denver Board of Water Commissioners, Colo.
For primary bibliographic entry see Field 6A.
W74-09654

ALTERNATIVE SOLUTIONS TO WATER RESOURCE DEVELOPMENT--A CASE STUDY,
Texas A and M Univ., College Staztion. Water Resources Inst.
For primary bibliographic entry see Field 6B.
W74-09661

DATA ACQUISITION AND COMBINED SEWER CONTROLS IN CLEVELAND,
Cleveland Dept. of Public Utilities, Ohio.
For primary bibliographic entry see Field 5D.
W74-09716

FLOOD RUNOFF SYSTEMS WITH COLLECTOR CHANNEL AND FAST DISCHARGE FOR DAMS (VOLGYZAROGATAK GYUJTOCSATORNAS, SURRANTOS ARAPASZTOI),
For primary bibliographic entry see Field 8A.
W74-09720

REALIZATION OF THE DANUBE FLOOD PROTECTION PROJECT FOR VIENNA (DAS WERDEN DES PROJEKTES FUER DEN DONAUHOCHWASSERSCHUTZ VON WIEN),
A. Grzywienski.
Osterreichische Ingenieur-Zeitschrift, Vol 16, No 11, p 379-385, November, 1973. 4 fig, 45 ref.

Descriptors: *Flood protection, Dams, Flood recurrence interval, Channels, *Flood control, Flood routing.
Identifiers: *Austria(Vienna), *Danube River.

The flood protection project being constructed in the Vienna, Austria, area is described. The dams will be elevated, and double protection will be consequently built up around Vienna to meet floods occurring at an estimated frequency of one in every 10,000 years. A flood release channel diverts up to 5,000 cu meters water per second whenever the yield in the Danube exceeds 5,000 cu m/sec. The areas around Vienna not belonging to the urban agglomeration will have a flood protection system designed for a flood frequency of one in every 1,000 years. (Takacs-FIRL)
W74-09739

DYNAMICS OF FOREST, MEADOW AND SWAMP VEGETATION IN CONNECTION WITH RECLAMATION (BASED ON STUDIES IN BELORUSSIA), (IN BYELORUSSIAN),
For primary bibliographic entry see Field 2I.
W74-09746

TUNNELS MAY STORE STORMWATER FOR LATER TREATMENT.
For primary bibliographic entry see Field 5D.
W74-09749

DELAYS IN THE OPERATION OF SUBSURFACE DRAINAGE TRENCHING MACHINES,
Quebec Ministere de l'Agriculture et de la Colonisation, Buckingham.
For primary bibliographic entry see Field 8C.
W74-09794

DRAINAGE INVESTIGATIONS AND FINDINGS ON THE GOTVAND PROJECT - IRAN,
Harza Engineering Co., Chicago, Ill.
For primary bibliographic entry see Field 2G.
W74-09797

OPTIMIZING SURFACE IRRIGATION UNIFORMITY BY NONUNIFORM SLOPES,
CH2M-Hill, Redding, Calif.
For primary bibliographic entry see Field 3F.
W74-09800

4B. Groundwater Management

GROUND WATER QUALITY AND SOLID WASTE MANAGEMENT-- A SELECTIVE BIBLIOGRAPHY,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 5E.
W74-09319

UNDERGROUND INJECTION OF WASTEWATERS IN THE OHIO VALLEY REGION.
Ohio River Valley Sanitation Commission, Cincinnati. Committee on Subsurface Industrial Wastewater Injection.
For primary bibliographic entry see Field 5G.
W74-09324

GROUND-WATER DATA, 1972, INDIAN WELLS VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
R. L. Banta.
Open-file report, August 1973. 12 p, 5 fig, 1 tab, 3 ref.

Descriptors: *Water levels, *Groundwater, *California, Data collections, Hydrologic data, Water wells, Drawdown, Withdrawal.
Identifiers: *Indian Wells Valley(Calif).

Water-level measurements were made in about 110 wells in Indian Wells Valley, California, in October 1972. The average water-level declined 3.5 feet in six wells between October 1971 and October 1972. The total pumpage from Indian Wells Valley during 1972 was about 15,200 acre-feet, an increase of about 6 percent over 1971. Water samples were collected from 67 wells in Indian Wells Valley in 1972 for chemical analysis. Principal constituents determined in the analyses are listed. (Knapp-USGS)
W74-09352

WATER BALANCE IN SEWAGE STABILIZATION LAGOONS,
North Dakota Univ., Grand Forks. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-09361

PROGRESS REPORT ON THE EFFECT OF GROUND-WATER CONDITIONS ON LOCAL FLOODING IN THE KINGSTON AREA, PA.,
Geological Survey, Harrisburg, Pa.
D. J. Growitz.
Open-file report, December 1973. 4 p, 1 fig, 1 tab.

Descriptors: *Water levels, *Groundwater, *Pennsylvania, *Water level fluctuations, Data collections, Hydrologic data, Hydrogeology, Flooding.
Identifiers: *Kingston(Penn).

An observation-well network and surface-water measuring points were established to monitor fluctuations of groundwater and surface-water levels near Kingston, Pennsylvania. Water-level elevations of both surface water and groundwater are generally highest in the spring and lowest in the fall. The objectives of this study are to determine the source and movement of groundwater and the seasonal fluctuation in groundwater levels in order to delineate areas in and adjacent to Kingston where basement flooding occurs and to determine the severity of the flooding. In addition, factors that control the surface and subsurface routing of water are to be determined, so that methods to alleviate flooding can be proposed and evaluated. (Knapp-USGS)
W74-09366

GEOLOGIC ASPECTS OF LANDFILL REFUSE DISPOSAL,
Louisville Univ., Kentucky. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-09375

WATER SUPPLY EVALUATION AND PROPOSED COMPREHENSIVE STUDY OF THE CHARLESTON-BUSHY PARK INDUSTRIAL COMPLEX, SOUTH CAROLINA,
Geological Survey, Columbia, S.C.
For primary bibliographic entry see Field 2L.
W74-09389

WATER-TABLE FLUCTUATION IN RESPONSE TO RECHARGE,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 2F.
W74-09409

SOIL CLOGGING DURING INFILTRATION OF SECONDARY EFFLUENT,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5D.
W74-09467

ANALYTICAL MODEL FOR MANAGEMENT OF ALLUVIAL AQUIFERS,
Colorado Dept. of Natural Resources, Denver. Div. of Water Resources, Planning and Investigations.
R. Qazi, and J. Danielson.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 100, No IR2, Paper no 10627, p 143-152, June 1974. 5 fig, 1 tab, 4 ref.

Descriptors: *Alluvial aquifers, *Wells, *Pumping, *Water management(Applied), *Simulation analysis, *Computer models, Groundwater, Flow, Water table, Reservoir storage, Recharge, Rivers, Surface waters, Conjunctive use, Water delivery, Water supply, Damages, Drawdown, Canals, Irrigation water, Municipal water, Computer programs, Equations, Evaluation, Systems analysis, *Colorado.
Identifiers: Stream depletion, Water augmentation, South Platte River(Colo.), Algebraic summation.

Under the doctrine of prior appropriation, the recent inclusion of wells in the existing priority system of water rights in Colorado has created new problems for water management in tributary alluvial aquifers. Irrigation and municipal wells, generally subordinate to surface water rights on a river, are subject to complete shut down if they cannot compensate for the river depletion due to pumping; to shut these wells off could mean economic disaster to large rural areas in Colorado. Therefore, augmentation plans have been accepted by the Division of Water Resources whereby well owners must provide for river depletion in both time and space either by recharge operations or by direct deliveries to the river from acquired surface water. To evaluate these plans, an analytical approach using computer simulation has been derived to estimate the change in storage of the groundwater and the rate and amount of movement of water to and from the river. The model, presented in detail, can provide quick estimates of the volumetric movements and the fluctuation of the water table due to any combination of wells, recharge lines, or pit operations in an alluvial (unconfined) aquifer. Model applications to the South Platte River in Colorado, and results, are discussed. Compared to other conjunctive use models, this does not require voluminous amounts of input data. (Bell-Cornell)
W74-09477

OPERATION AND MAINTENANCE OF WELLS,
Stamm-Scheele, Inc., Rayne, La.
For primary bibliographic entry see Field 8G.
W74-09524

CORRELATION BETWEEN TURBIDITY AND IRON CONTENT OF THE FILTER EFFLUENT OF WELL ORIGIN,
Yugoslav Dept. of Water Treatment Plant Automation, Belgrade.
For primary bibliographic entry see Field 5B.
W74-09526

MANAGING WATER RESOURCES FROM THE WRONG PLACE AT THE WRONG TIME,
California State Dept. of Water Resources, Sacramento. Div. of Resources Development.
For primary bibliographic entry see Field 6B.
W74-09528

(WATER WELL CONTRACTOR SURVEY).
Water Supply Management, Barrington, Ill.
1971, 21 p, 59 tab.

Descriptors: Wells, *Groundwater, *Surveys, Publications, Statistical methods, Estimating, Investigations, *Drilling, *Water wells, Irrigation wells, *Well data.
Identifiers: Domestic wells, Industrial wells, Waste disposal wells, Livestock supply wells.

A profile is presented of the driller market with regard to 6,100 water well contractors, and their buying habits, their attitudes about products and well industry issues, and the types of wells they drilled in 1969. Buying habits and attitudinal material are presented as national composite figure only; a breakdown into nine geographical areas allow regional information to also be reported for well numbers, depths and diameters drilled, rigs used, pumps installed, and casing and screening used per well type. Data are reported for the following well types: municipal; industrial; domestic; livestock supply; irrigation; sprinkler system; air conditioning system supply; waste disposal; other miscellaneous types of wells. A 10 per cent national reply was received, and served as the basis for projections on well numbers nationally and for each area. (Martino-NWWA)
W74-09529

GROUND-WATER CONDITIONS CAUSED BY TROPICAL STORM AGNES,
Susquehanna River Basin Commission, Mechanicsburg, Pa.
J. R. Hollowell.
Pennsylvania Geology, Vol 2, No 5, p 2-9, April 1974. 7 fig.

Descriptors: *Groundwater, *Flood damage, Building codes, Hydrographs, Hurricanes, Water level fluctuations.
Identifiers: *Groundwater flooding, *Susquehanna river basin, *Tropical storm Agnes.

Hydrographs from U.S. Geological Survey observation wells in the Susquehanna River Basin were analyzed to determine ground-water response to tropical storm Agnes. The amount and intensity of the rainfall associated with the tropical storm was sufficient to create all-time high water levels in most of the observation wells. Four hydrographs are presented to show how topography was a major factor in the water-level fluctuations caused by the tropical storm. From these data the geologic and topographic settings subject to ground-water flooding were recognized and delineated. (Staplin-NWWA)
W74-09532

O AND M COSTS: PAY NOW OR PAY LATER,
National Water Well Association, Houston, Tex. Research Facility.
M. D. Campbell, and S. N. Goldstein.
Water Well Journal, Vol 28, No 2, p 26-27, 66-68, February 1974.

Descriptors: *Operation and Maintenance, *Rural areas, Management, Economics, Wells, *Operating costs, *Maintenance costs.
Identifiers: Water systems, Cost efficiency, Support companies, Well longevity.

The operation and maintenance of rural water systems is discussed in terms of economics and availability to rural residents. National Demonstration Water Project (NDWP) is now experimenting with a regional management approach to operation and maintenance that is designed to provide low-cost, dependable service to rural areas. NDWP affiliate projects are forming support companies that provide operation and maintenance services such as: (1) billing and collecting, (2) sampling and testing, (3) contracting, (4) inspecting facilities and water quality and (5) providing consulting and training programs. A cost breakdown showing the amount spent on operation and maintenance for a typical small rural company is given. Routine operation and maintenance procedures will often extend the life of a rural water system resulting in a long term savings in the total cost of the system. (Staplin-NWWA)
W74-09533

WATER WELL DESIGN FOR EARTHQUAKE-INDUCED MOTIONS,
Bechtel Power Corp., Los Angeles, Calif.
For primary bibliographic entry see Field 8B.
W74-09535

VARIABLES AFFECTING WELL SUCCESS IN A KENTUCKY LIMESTONE AQUIFER,
Kentucky Univ., Lexington. Dept. of Geology.
J. T. Johnson, and J. Thrailkill.
Journal of Hydrology, Vol 20, No 4, p 327-333, December 1973. 1 fig, 1 tab, 12 ref.

Descriptors: *Wells, *Water wells, *Groundwater, Aquifers, Statistical methods, *Limestone, Geology, Beds(Stratigraphic), Hydrology, Areal hydrogeology, Stratigraphy, Lithology, Water supply, Water pollution, Saline water, *Kentucky.
Identifiers: *Centerville Quadrangle(Ky), Synclines, Anticlines, Non-parametric tests.

Ten variables were examined using non parametric statistical tests (Mann-Whitney U and chi square) to evaluate the influence of these variables on ground water supply in the Centerville Quadrangle, Kentucky. Variables found to be significant were those directly related to lithology (wellhead stratigraphy and well-bottom stratigraphy) and those interpreted as being strongly influenced by lithology (well depth, wellhead elevation, and

well-bottom elevation). In addition, wells judged adequate for water supply were closer to surface streams and bottomed closer to stream level than dry holes. Adequate wells were also closer to synclinal axes than dry holes. There was no significant difference between dry holes and adequate wells in their distance from sinkholes or regional structural position. Wells producing H2S-containing water differed from adequate wells only with regard to variables related to lithology but saline-water wells were more abundant in areas distant from surface streams as well as in unfavorable lithology. (Martino-NWWA)
W74-09543

PROBLEMS RELATED TO THE EVALUATION OF GROUNDWATER RESOURCES OF THE CRYSTALLINE ROCK AREA, SAN DIEGO COUNTY, CALIFORNIA,
California State Univ., San Diego. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W74-09544

TWO TESTS FOR THE CLUSTER WELL CONCEPT,
Conset, Inc., Washington, D.C. National Demonstration Water Project.
For primary bibliographic entry see Field 8A.
W74-09549

GROUNDWATER QUALITY. DOOR COUNTY, WISCONSIN.
Wisconsin Univ., Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 5B.
W74-09565

SUBSURFACE DISPOSAL OF PICKLE LIQUOR,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 5E.
W74-09583

GROUNDWATER POLLUTION.
For primary bibliographic entry see Field 5B.
W74-09590

SEPTIC TANKS AND GROUNDWATER POLLUTION,
Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5B.
W74-09593

GROUNDWATER POLLUTION BY AGRICULTURE,
Louisiana Tech. Univ., Ruston. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W74-09595

POLLUTION STUDIES OF THE REGIONAL OGALLALA AQUIFER AT PORTALES, NEW MEXICO,
Eastern New Mexico Univ., Portales. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W74-09596

HYDRAULIC TESTING AND SAMPLING OF HOLES RB-E-01 AND RB-D-01, PROJECT RIO BLANCO, RIO BLANCO COUNTY, COLORADO,
Geological Survey, Lakewood, Colo.
J. E. Weir, Jr.
Available from NTIS, Springfield, Va. 22151 - Price $3.00 printed copy; $1.45 microfiche. Contract Report USGS-474-150, (Rio Blanco-1) for US Atomic Energy Commission, November 1972. 28 p, 6 fig, 2 tab, 3 ref. USAEC Contract AT(29-2)-474.

Descriptors: *Aquifer testing, *Water yield, *Water wells, *Colorado, Aquifers, Confined water, Water levels, Transmissivity, Hydrogeology, Hydrologic data, Sampling, Water quality.
Identifiers: *Rio Blanco County(Colo).

The discharge of water was monitored during drilling of two holes (RB-E-01 and RB-D-01) at the Rio Blanco site in western Colorado. Recovery of water level was measured following periods of water withdrawal from hole RB-D-01. Two intervals of hole RB-D-01 were tested. Zone 1, from 245 to 845 feet below land surface, has a transmissivity of about 4,600 gallons per day per foot and a static water level of 59.90 feet below land surface. Zone 2, from 882 to 1,651 feet below land surface, has a transmissivity of about 200 gallons per day per foot and a static water level of 39.63 feet below land surface. There is potential at hole RB-D-01 for flow of water upward from zone 2 to zone 1; however, differences in quality of water in the two zones indicate that water probably does not circulate freely between the zones. (Knapp-USGS)
W74-09601

GEOLOGY AND QUALITY OF WATER IN THE MODESTO-MERCED AREA, SAN JOAQUIN VALLEY, CALIFORNIA, WITH A BRIEF SECTION ON HYDROLOGY,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4A.
W74-09605

OPTIMAL PUMPING FOR AQUIFER DEWATERING,
Stanford Univ., Calif. Dept. of Geology.
E. Aguado, I. Remson, M. F. Pikul, and W. A. Thomas.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY7, Paper 10639, p 869-877, July 1974. 5 fig, 1 tab, 3 ref, 2 append.

Descriptors: *Dewatering, *Mathematical models, *Drawdown, Linear programming, Excavation, Withdrawal, Groundwater movement, Drainage engineering, Finite element analysis.

A method is presented for determining the optimal well locations and steady-state pumping scheme for dewatering a construction site. It uses the finite-difference approximations of the groundwater differential equation as constraints in a linear programming model. The method was used to determine optimal well distributions and steady-state pumping patterns for dewatering a dry dock excavation site. Because the method is restricted to steady-state solutions, auxiliary use was made of the transient numerical model to predict dewatering times. Solutions of alternate optimization problems may be achieved readily. For example, it might be desirable to restrict the number of wells or restrict their locations. It might be desirable to consider economic factors. Such solutions may be achieved with modifications of constraints or objective functions. (Knapp-USGS)
W74-09620

GEOHYDROLOGY OF CROW CREEK AND LOWER BRULE INDIAN RESERVATIONS, SOUTH DAKOTA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-09638

OUTLINE OF THE HYDROGEOLOGY OF SIBERIA (OCHERKI PO GIDROGEOLOGII SIBIRI).
Institut Zemnoi Kory, Irkutsk (USSR).
For primary bibliographic entry see Field 2F.
W74-09641

PRESENT STATE AND PROSPECTS OF GROUNDWATER USE FOR WATER SUPPLY OF POPULATED AREAS IN IRKUTSK OBLAST (SOSTOYANIYE I PERSPEKITIVY ISPOL'ZOVANIYA PODZEMNYKH VOD DLYA VODOSNABZHENIYA OBZHITOY CHASTI IRKUTSKOY OBLASTI),
Institut Zemnoi Kory, Irkutsk (USSR).
R. F. Ivanilova.
In: Ocherki po gidrogeologii Sibiri; Komissiya po Izucheniyu Podzemnykh Vod Sibiri i Dal'nego Vostoka Materialy, No 6, p 53-57, Novosibirsk, 1973.

Descriptors: *Groundwater, *Water utilization, *Water supply, *Human population, *Urbanization, Cities, Water wells, Rocks, Geologic time.
Identifiers: *USSR(Irkutsk Oblast).

The Irkutsk Oblast has vast supplies of fresh groundwater suitable for use. Various organizations in the Oblast have drilled more than 2,000 boreholes for water, about 1,800 of which are being exploited. The number of wells in the Oblast is 15,400, and the number of springs is over 200. Usable groundwater can be found in deposits of varying ages, ranging from young Quaternary to ancient Archean, inclusive. Conditions are favorable for obtaining fresh groundwater in the Irkutsk, Kachug, Nizhneudinsk, Tayshet, and Tulun Rayons. In almost all populated areas in these regions fresh groundwater occurs at depths rarely exceeding 100 m, and well productivity averages 0.5 to 10 liters/sec at slight drawdown. Less favorable are water-supply conditions in the Zalari, Kuytun, Ust'-Uda, Cheremkhovo, Alarskiy, Bokhan, and Ekhirit-Bulagatskiy Rayons, where fresh groundwater is either nonexistent or exploratory work and exploitation conditions are difficult. Water supply conditions are also unfavorable in populated areas removed from the zone of inundation of the Bratsk Reservoir. Cities in the Irkutsk Oblast which have a centralized water supply are Irkutsk, Angarsk, Shelekhovo, Usol'ye-Sibirskoye, Cheremkhovo, and Bratsk. Water supply of these cities has until now been entirely based on surface waters, although attempts have been made to use groundwater. Outside these cities water supply is decentralized and is based mainly on surface waters and waters of Quaternary deposits, the quality of which, in most coses, fails to meet water-quality standards. Groundwater of bedrock is being used in small towns and urban settlements. Exploratory work is underway to convert the population of the Oblast to use of groundwater for its water supply. (See also W74-09641) (Josefson-USGS)
W74-09643

PRESENT STATE AND PROSPECTS OF USE OF THERAPEUTIC MINERAL WATERS IN THE IRKUTSK OBLAST (SOSTOYANIYE I PERSPEKTIVY ISPOL'ZOVANIYA LECHEBNYKH MINERAL'NYKH VOD IRKUTSKOY OBLASTI),
Institut Zemnoi Kory, Irkutsk (USSR).
For primary bibliographic entry see Field 2K.
W74-09644

PROBLEMS OF HYDROGEOLOGIC INVESTIGATIONS IN THE EASTERN PART OF THE USSR IN 1971-75 (ZADACHI GIDROGEOLOGICHESKIKH ISSLEDOVANIY NA VOSTOKE SSSR NA 1971-1975 GG),
Institut Zemnoi Kory, Irkutsk (USSR).
S. G. Beyrom, N. M. Bogatkov, Ye. V. Pinneker, B. I. Pisarskiy, and O. N. Tolstikhin.
In: Ocherki po gidrogeologii Sibiri; Komissiya po Izucheniyu Podzemnykh Vod Sibiri i Dal'nego Vostoka Materialy, No 6, p 120-130, Novosibirsk, 1973.

Descriptors: *Investigations, *Exploration, *Hydrogeology, *Groundwater, *Groundwater resources, Aquifers, Areal hydrogeology, Natural resources, Water conservation, Water pollution, Water quality, Mineralogy, Water types, Distribution patterns, Estimating, Evaluation, Forecasting.
Identifiers: *USSR(Siberia), Soviet Far East.

Basic problems of hydrogeologic investigations in Siberia and Soviet Far East in 1971-75 were discussed in a paper presented at the Sixth Conference on Groundwater of Siberia and Soviet Far East, held in Khabarovsk in October 1970. These problems included: (1) estimation of natural groundwater resources by large hydrogeologic regions; (2) complex hydrogeologic investigations in oil- and gas-bearing regions and study of groundwater distribution patterns in deep horizons; (3) study of groundwater distribution patterns in the zone of aeration in areas of hydraulic construction, reclamation, and irrigation, and forecasting of changes resulting from man's engineering activities; (4) evaluation of the state of inundation of hard mineral deposits and improvement of hydrogeologic prospecting techniques; and (5) investigations on conservation of groundwater and its protection from depletion and contamination. (See also W74-09641) (Josefson-USGS)
W74-09647

ANTIMONY IN GROUNDWATER OF THE KADAMDZHAY DEPOSIT (SUR'MA V PODZEMNYKH VODAKH KADAMDZHAYSKOGO MESTOROZHDENIYA),
Tomsk Polytechnic Inst. (USSR).
N. M. Shvartseva.
Akademiya Nauk SSSR Doklady, Vol 207, No 5, p 1220-1222, 1972. 1 fig, 1 tab, 13 ref.

Descriptors: *Geochemistry, *Water chemistry, *Mineralogy, *Groundwater, Water types, Water sampling.
Identifiers: *USSR(Kadamdzhay deposit), *Antimony, Antimonite, Mineralization.

Distribution of antimony in water was investigated at the surface and in joints, solution openings, and fracture zones of the Kadamdzhay antimony depost. Antimony was found in all water samples in relatively large concentrations. Its concentration in water related to ore mineralization does not exceed 128 micrograms/liter, whereas that in water unrelated to ore mineralization reaches 5,750 micrograms/liter, averaging 2,845 micrograms/liter. High antimony concentrations in neutral and mildly alkaline waters of the Kadamdzhay deposit show that antimonite is readily dissolved under specific conditions, possible under the influence of autotrophic organisms. This promotes widespread leaching of antimony beyond the deposit and formation of aqueous dispersion halos in the Shakhimardan River, where the antimony concentration decreases gradually away from the deposit. The size of these aqueous dispersion halos reaches 1.5 km. (Josefson-USGS)
W74-09648

4C. Effects On Water Of Man'S Non-Water Activities

FLOOD SURVEY AT PROPOSED TAPS CROSSING OF YUKON RIVER NEAR STEVENS VILLAGE, ALASKA,
Geological Survey, Anchorage, Alaska.
J. M. Childers, and R. D. Lamke.
Open-file report, 1973. 12 p, 4 fig, 1 tab, 7 ref.

Descriptors: *Floods, *Alaska, *Pipelines, Scour, Stage-discharge relations, Design flood, Historic floods, Erosion, Surveys.
Identifiers: *Trans-Alaska Pipeline, *Yukon River(Alas).

A flood survey and a hydraulic analysis were made at the proposed pipeline and highway bridge crossingof the Yukon River, Alaska. The Maximum Evident Flood at the proposed crossing, section 6, was 890,000 cu ft per sec at an elevation of 301 feet. The Standard Project Flood (or design flood), at 1,600,000 cu ft per sec, will reach an elevation of 322 feet at the proposed crossing. No ice-jam evidence was found. No significant scour or fill occurs at high flow. (Knapp-USGS)
W74-09405

THE EFFECTS OF LAND USE ON SALMON PRODUCTION,
Alaska State Dept. of Fish and Game, Juneau.
S. C. Smedley, K. E. Durley, and C. C. Larson.
Available from NTIS, Springfield, Va 22151 as COM-73-10895 Price $3.00 printed copy; $1.45 microfiche. Completion Report to National Marine Fisheries Service, July 1972, 82 p.

Descriptors: *Salmon, *Lumbering, *Water pollution effects, *Land use, Land management, *Alaska, Fisheries, Forestry, Forest management.

To assess the effects of land use (primarily logging) in Alaska on the salmon spawning environment, a monitoring program was initiated in 1963. Three major salmon streams, capable of handling escapements of 100,000 or more pink salmon per year, were chosen. These are Staney Creek and 108 Creek (also known as Big Creek) on the Kasaan District of the South Tongass National Forest and Kadashan Creek, Sitka District, 1968, North Tongass National Forest. Seven years of monitoring in 108 Creek of (1) adult pink salmon escapement, (2) streambed composition, (3) streambed stability, and (4) production of pink salmon fry, show a drop in adult escapements, marked increase of fine materials in the spawning grounds, a relatively stable streambed, a drop in pink salmon fry production, and a rise in percentage fry survival between eyed eggs and pre-emergence when adult spawners are relatively sparse. Equally important, these affects have been noted in a stable, lake-fed stream where logging and road building have been conducted under careful supervision. No careless practices have been tolerated. Land use was apparently unrelated to the initial drop in odd-year adult pink salmon runs and fry production. The drought year 1965 seems the primary cause of depression. High salmon egg deposition plus a high percentage of fine materials in 1964 and particularly in 1966 presumably created a BOD too high to be met, resulting in low fry survival and eventually a low 1968 adult return. Contributions of sediment to 108 Creek through small tributary streams were identified as coming from the road system and from logs skidding over and breaking tributary streambanks. Slumps in unlogged areas from the banks of 108 Creek also contributed significant suspended sediment load. A significant (1.3 to 1.4 deg F) increase in water temperature was found in the summer of 1966 and 1967 when compared with water temperatures of summers, 1964 and 1965. This increase might be ascribed to logging. (Knapp-USGS)
W74-09411

ROAD SALT, DRINKING WATER AND SAFETY,
Little (Arthur D.), Inc., Cambridge, Mass. Public Affairs Center.
R. C. Terry.
Ballinger Publishing Company, Cambridge, Mass. 1974. 159 p.

Descriptors: *Sodium chloride, Water quality, *Salt, *Ice, Snow, *Potable water, Deicers, Safety, Public health.
Identifiers: *Road salt, *Deicing.

An analysis is provided of the rapidly emerging health problems and medical concern over levels of sodium in both public and private water supplies which can be traced directly to de-icing practices. The development of the various winter road policies are reviewed, and the difficulties of present water quality standards are evaluated. A detailed discussion of the many variables which cause problems in setting reasonable salt-use policies is presented, and recommendations for local community programs and state-wide legislation are offered. (Martino-NWWA)
W74-09537

SOME POTENTIAL ENVIRONMENTAL PROBLEMS FROM POPULATION EXPLOSION AND URBAN DEVELOPMENT IN MASSACHUSETTS AND ADJACENT PARTS OF NEW ENGLAND,
Massachusetts Univ., Amherst. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W74-09598

4D. Watershed Protection

PRINCIPLES AND STANDARDS FOR PLANNING WATER AND RELATED LAND RESOURCES.
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-09278

AN EVALUATION OF THE IMPACT OF LAND USE ON ENVIRONMENTAL QUALITY,
Argonne National Lab., Ill. Center for Environmental Studies.
For primary bibliographic entry see Field 4A.
W74-09419

ESTIMATION OF WASHLOAD PRODUCED ON CERTAIN SMALL WATERSHEDS,
New York State Univ., Buffalo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W74-09618

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

LASER RAMAN SPECTROSCOPY OF SOLUTES DISSOLVED IN WATER FROM A REMOTE PLATFORM,
Rhode Island Univ., Kingston. Dept. of Chemistry.
C. W. Brown.
Available from the National Technical Information Service as PB-233 432, $3.00 in paper copy, $1.45 in microfiche. Completion Report, (1974). 17 p, 6 fig, 1 tab, 3 ref. OWRR B-036-RI(4). 14-31-0001-3641.

Descriptors: Pollutants, *Remote sensing, *Pollutant identification, *Spectroscopy, Oil pollution, Sodium, Solutes, Aqueous solutions, *Anions.
Identifiers: *Laser raman spectroscopy, *Sodium salts.

An optical system for obtaining remote Raman spectra of ionic solutes dissolved in water has been built and tested. At present, the system has been used to detect and identify 150 ppm of NO_3^- at a distance of 21 ft. Furthermore, the same system has been used to detect oil slicks on the surface of water.
W74-09255

MERCURY LEVELS IN FISH FROM SELECTED WISCONSIN WATERS (A PRELIMINARY REPORT),
Wisconsin Dept. of Natural Resources, Madison. Bureau of Research.
S. J. Kleinert, and P. E. Degurse.
Research Report 73, 1971. 16 p, 1 fig, 3 tab, 15 ref.

Descriptors: *Mercury, *Fish, *Wisconsin, Data collections, Poisons, Path of pollutants, Public health, Industrial wastes.

Elevated levels of mercury were found in Wisconsin fish in sections of the Chippewa, Flambeau, and Wisconsin Rivers. Seventy-one percent of all samples testing over 0.5 ppm mercury and 95% of all fish testing over 1.0 ppm mercury in this Survey came from these three rivers. Elsewhere in Wisconsin, levels of individual fish samples sometimes approach or exceed 0.5 ppm mercury, but the average mercury level is below 0.5 ppm. (Knapp-USGS)
W74-09371

CHARLESTON AREA SEDIMENT SAMPLES,
South Carolina Pollution Control Authority, Columbia.
H. E. Gibson.
In: Cooper River Environmental Study: South Carolina Water Resources State Water Plan Report No 117, p 105-118, April 1974. 7 fig, 4 ref, 1 append.

Descriptors: *Bottom sediments, *Estuaries, *South Carolina, Oxygen demand, Nitrogen, Oil, Mercury, Lead, Zinc, Sampling, Data collections, Pollutant identification.
Identifiers: *Charleston Harbor(SC), *Cooper River(SC).

Samples of sediment were collected in Charleston Harbor during August 1972 and delivered to Laboratory Services. Analyses were made between September and December. Volatile solids, chemical oxygen demand, total kjeldahl nitrogen, oil and grease, mercury, lead, and zinc were determined. (See also W74-09379) (Knapp-USGS)
W74-09386

SURVEY OF ENVIRONMENTAL RADIOACTIVITY, (JANUARY 1973-DECEMBER 1973).
Minnesota Dept. of Health, Minneapolis.
Available from NTIS, Springfield, Va., as COO-651-90 for $3.00 paper copy; $1.45 microfiche. Report No. COO-651-90, April 1974. 61 p, 8 fig.

Descriptors: *Surveys, *Minnesota, *Radioactivity, *Nuclear powerplants, *Effluents, *Data collections, Water pollution, Precipitation(Atmospheric), Surface waters, Sewers, Milk, Iodine, Cesium, Strontium, Radioisotopes, Public health, Rivers, Sampling, Analytical techniques.
Identifiers: *Elk River.

A surveillance program of the state of Minnesota includes the Elk River Reactor site during the dismantling of the Elk River Reactor. A considerable increase in radioactivity in all media analyzed occurred in the middle of 1961 due to fallout from nuclear weapons testing. The peak for gross beta activity in Minnesota surface waters was reached early in 1963. A peak for air particulates was reached in the latter half of 1961, followed by a second peak early in 1963. From 1963 to 1965, the general trends of radioactivity in precipitation, surface waters and air have been downward. Since 1965, levels of radioactivity in these media have generally stabilized. The activity in processed fluid milk reached a peak for iodine-131 in 1962. Since late 1963, iodine-131 in samples analyzed has been less than the minimum practical reporting limit of ten. Peaks for cesium-137 and strontium-90 occurred in processed fluid milk during 1963 and 1964, respectively. After a rapid downward trend, cesium-137 levels have stabilized. Levels of strontium-90 in processed fluid milk stabilized after a more prolonged period of decline than that observed for cesium-137. Detailed description of survey methods and sampling locations are included. (Houser-ORNL)
W74-09431

PESTICIDE ANALYSIS IN WATER,
Environmental Protection Agency, Springfield, Ill.
J. T. Hurley.
Journal of the American Water Works Association, Vol 66, No 1, p 27-31, January, 1974. 12 fig.

Descriptors: Instrumentation, Chromatography, *Gas chromatography, *Measurement, *Pesticides, *Chlorinated hydrocarbons, Organophosphorus pesticides, Carbamate pesticides, Herbicides, Water pollution, *Pollutant identification, Municipal wastes, *Potable water, Water supply.
Identifiers: Phenoxy herbicides.

The detection and analysis of pesticides in drinking water supplies are discussed. Pestides can be divided into several classes according to their chemical structure as follows: chlorinated hydrocarbon pesticides, organophosphorus pesticides, carbamates, and phenoxy herbicides. In investigating the levels and types of pesticides in water, it is important to know toxicity, extent of usage, persistence in the environment, biomagnification, and sensitivity of detection. The chlorinated insecticides are one of the most important groups. They are widely used, toxic to mammals, persistent, have a long half-life, and undergo biomagnification, ultimately being stored in the fatty tissue of the body. The gas chromatograph system consists of five parts: pressure regulator and flowmeter for the carrier gas, sample-injection system, a column, a detector, and a recorder. It is sensitive, selective, and suitable for determining pesticide levels in water. (Merritt-FIRL)
W74-09484

COMPARING EFFLUENT RELEASES FROM NUCLEAR AND FOSSILFUELED POWER PLANTS,
Brookhaven National Lab., Upton, N.Y. Health Physics and Safety Div.
For primary bibliographic entry see Field 5B.
W74-09503

TRACE METAL CONTAMINANTS.
Dimensions/NBS, Vol 57, No 10, p 244-245, October, 1973. 2 ref.

Descriptors: *Natural resources, *Water quality standards, *Metals, *Mercury, *Toxicity, Cadmium, Lead, Heavy metals, Copper, Organic acids, *Trace elements, *Pollutant identification.
Identifiers: Nuclear magnetic resonance, Mass spectrometry, Polarography.

The determination of trace levels of toxic metals in natural waters is being investigated at the National Bureau of Standards. A study of the chemical, biological, and other mechanisms operative in natural water systems for mobilization and transport of heavy metal focuses on the transformation of inorganic mercury into highly toxic forms. Field samples of sediment and water are being analyzed for total mercury and organic mercury by nuclear magnetic resonance and mass spectrometry. In another similar project, cathode ray polarography has led to the development of improved methods for determining metals and organic substances, such as nitriloacetic acid. A stable isotope dilution procedure was developed using the spark source mass spectrograph for simultaneously determining a dozen trace elements in river water samples. Concentrations in parts per billion were determined for mercury, cadmium, lead, and copper. (Merritt-FIRL)
W74-09512

PITFALLS IN PARAMETER ESTIMATION FOR OXYGEN TRANSFER DATA,
Wisconsin Univ., Madison.
W. C. Boyle, P. M. Berthouex, and T. C. Rooney.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE2, p 391-408, April, 1974. 10 fig, 4 tab, 8 ref.

Descriptors: *Model studies, *Estimates, *Aeration, Analytical techniques, Numerical analysis, Oxygen, Dissolved oxygen.
Identifiers: *Oxygen transfer data.

Some of the pitfalls of methods of parameter estimation application to the analysis of oxygen transfer data are examined. The following must be considered: know the error structure of the data and apply appropriate weighting procedures in the analysis of the data; corroborate the value of the dissolved oxygen saturation concentration employed to estimate the overall oxygen transfer coefficient (K) through experimental data for a given physical arrangement of aeration and basin geometry. Truncation of an aeration test before reaching saturation can produce substantial error in estimates of K unless a precise estimate of the dissolved oxygen concentration (C) can be determined. Truncation of dissolved oxygen data up to 20% will not effect the precision of the estimate of K. The product of KC tends to compensate for erros in K and C and will normally give reasonable estimates of the oxygen transfer rate. Poor estimates of C will tend to produce substantial error in the calculation of oxygen transfer rates. (Merritt-FIRL)
W74-09514

HEALTH EFFECTS OF ENVIRONMENTAL POLLUTANTS,
For primary bibliographic entry see Field 5C.
W74-09547

DETECTION OF TRACE METALS IN WATER,
J. D. Kerber.
Industrial Water Engineering, p 19-21, September-October 1973. 3 fig, 2 tab.

Descriptors: *Trace elements, *Water analysis, *Spectrophotometry, *Analytical techniques, Separation techniques, Water sampling, Costs, Metals, *Pollutant identification.
Identifiers: *Atomic absorption spectroscopy.

Atomic absorption, the generally preferred method for the analysis of trace metallic pollutants is reviewed. It is a quantitative rather than qualitative technique for the determination of elements in analytical samples, and in general, the samples must be in solution or suspension. In atomic absorption, the sample is heated to a high temperature to convert the molecules to individual atoms which float freely in the sample area. In this condition, they can absorb ultraviolet or visible radiation. To determine the concentration of an element in the sample, the analyst passes light from a hollow cathode lamp containing that element. A certain portion of the light is absorbed by the flame heating the sample and the spectrophotometer reads out the results. Although atomic absorption is relatively free from interferences, there are detection limits. For certain elements, auxiliary sampling techniques must be employed to concentrate the element of interest and thereby bring its levels within the detection limit or to improve the detection limit capabilities of atomic absorption. The cost of equipment ranges from $4,000 to over $13,000. (Jernigan-Vanderbilt)
W74-09581

CHEMICAL SURVEY OF WATERS ADJACENT TO COLONELS ISLAND, GLYNN COUNTY, GEORGIA,
Skidaway Inst. of Oceanography, Savannah, Ga.
W. M. Dunstan, and R. R. Stickney.

Georgia University Marine Science Center Technical Report Series No 74-1, March 1974. 12 p, 1 fig, 4 tab, 5 ref.

Descriptors: *Water quality, *Estuaries, *Georgia, Mixing, Dissolved oxygen, Salinity, Water temperature, Water chemistry, Hydrogen ion concentration, Nitrates, Phosphates, Mixing.
Identifiers: *Brunswick River(Ga).

Basic measurements of the water quality of the Brunswick River adjacent to Colonels Island, Georgia were made over a tidal cycle. The reported values for temperature, salinity, dissolved oxygen, pH, ammonia, chlorophyll a, nitrate and phosphate while limited to one season are within the range of values which might be expected for such an estuarine-river system. All the parameters measured indicate that the estuarine area is well mixed. (Knapp-USGS)
W74-09584

A HYBRID AUTOMATIC ANALYSER,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
K. B. Pugh, and L. W. Chubb.
Chemosphere, Vol 3, No 3, p 97-101, June 1974. 1 fig, 2 plate, 5 ref.

Descriptors: *Chemical analysis, *Equipment, *Ammonia, *Nitrates, *Nitrites, Nitrogen, Automation, Water analysis, Colorimetry, Sampling, *Pollutant identification.

A three channel automatic analyser was constructed for ammonium, nitrite, and nitrate determinations. The system comprises sampler, proportioning pump, glassware, heating bath, colorimeters, and recorders. The system may also be used to determine phosphates in sea water. (Knapp-USGS)
W74-09622

AN ADAPTED DETERMINATION OF PHOSPHATE IN SEAWATER FOR USE WITH THE HYBRID AUTOMATIC ANALYSER,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
K. B. Pugh, and C. F. Gibbs.
Chemosphere, Vol 3, No 3, p 103-105, June 1974. 3 ref.

Descriptors: *Chemical analysis, *Equipment, *Ammonia, *Nitrates, *Nitrites, Nitrogen, Automation, Water analysis, Clorimetry, Sampling, *Pollutant identification.

A three channel automatic analyser was constructed for ammonium, nitrite, and nitrate determinations. The system comprises sampler, proportioning pump, glassware, heating bath, colorimeters, and recorders. The system may also be used to determine phosphates in sea water. (Knapp-USGS)
W74-09623

APPLICATION OF REAL-TIME MASS SPECTROMETRIC TECHNIQUES TO ENVIRONMENTAL ORGANIC GEOCHEMISTRY. II. ORGANIC MATTER IN SAN FRANCISCO BAY AREA WATER,
California Univ., Berkeley. Space Sciences Lab.
B. R. Simoneit, D. H. Smith, G. Eglinton, and A. L. Burlingame.
Archives of Environmental Contamination and Toxicology, Vol 1, No 3, p 193-208, 1973. 5 fig, 1 tab, 24 ref.

Descriptors: *Pollutant identification, *California, Rivers, *Bays, Solvents, Solubility, Sampling, Water sampling, *Organic matter, *Oil wastes, Gas chromatography, Mass spectrometry.
Identifiers: *San Francisco Bay, San Pablo Bay, Carquinez Strait, Sacramento River, San Joaquin River.

The solvent soluble (organic) matter passing through a fine fitted filter was investigated in samples of water taken from the San Francisco and San Pablo bays, the Carquinez Strait, and an estuary in the confluence of the Sacramento and San Joaquin rivers. The petroleum ether extracts (ranging) from 2.5 to 102 microgram/liter) were analyzed using gas chromatography, computer coupled gas chromatography/mass spectrometry, and high resolution mass spectrometry. The organic compounds identified in these extracts are quite diverse and consist mainly of hydrocarbons from various sources. Some phthalate esters occur at various sampling sites. It is concluded that the techniques of gas chromatography/mass spectrometry, and high resolution mass spectrometry are ideally suited to the assessment of some of the potential interactions of pollutants and other organic compounds in the aquatic environment. (Merritt-FIRL)
W74-09742

ERTS-1 VIRGIN ISLANDS EXPERIMENT 589--DETERMINE BOUNDARIES OF ERTS AND AIRCRAFT DATA WITHIN WHICH USEFUL WATER QUALITY INFORMATION CAN BE OBTAINED,
Grumman Ecosystems Corp., Bethpage, N.Y.
W. C. Coulbourn, W. G. Egan, D. A. Olsen, and G. B. Heaslip.
Available from NTIS, Springfield, Va 22151 as N74-1500 Price $14.75 printed copy; $1.45 microfiche. Grumman Ecosystems Corporation Final Contract Report to Goddard Space Flight Center, October 1973. 227 p, 110 fig, 41 tab. NASA Contract NAS 5-21811.

Descriptors: *Remote sensing, *Water quality, *Satellites(Artificial), *Virgin Islands, Water pollution, Turbidity, Data collections.
Identifiers: *ERTS.

The boundaries of ERTS and aircraft data within which useful coastal zone water quality information could be obtained were tested in the Virgin Islands. A secondary objective was to provide an expandable water quality data base. Ground truth data is necessary to properly interpret ERTS-1 MSS Scanner Radiance Values by correlating turbidity with physical, chemical and biological water properties. (Knapp-USGS)
W74-09756

CADMIUM UPTAKE BY WHEAT FROM SEWAGE SLUDGE USED AS A PLANT NUTRIENT SOURCE, A COMPARATIVE STUDY USING FLAMELESS ATOMIC ABSORPTION AND NEUTRON ACTIVATION ANALYSIS,
Karolinska Institutet, Stockholm (Sweden). Dept. of Environmental Hygiene.
For primary bibliographic entry see Field 5C.
W74-09758

MERCURY IN HUMAN HAIR, A STUDY OF THE RESIDENTS OF LOS ALAMOS, NM, AND PASADENA, CALIF., BY COLD VAPOR ATOMIC ABSORPTION SPECROPHOTOMETRY,
Cincinnati Univ., Ohio. Coll. of Medicine.
P. J. Nord, M. P. Kadaba, and J. R. J. Sorenson.
Archives of Environmental Health, Vol 27, No 1, p 40-44, July 1973. 2 fig, 2 tab, 12 ref.

Descriptors: *Mercury, Human physiology, *Analytical techniques, Toxicity, Contaminants, Public health, Testing procedures, Laboratory tests, Spectroscopy, Distribution, *California, *New Mexico, *Pollutant identification.
Identifiers: *Human hair, Atomic absorption spectroscopy.

Rapid digestion and quantitative mercury recovery are obtained when hair is digested in a mixture of nitric acid, sulfuric acid, and potassium permanganate. The studies were done on replicate samples drawn from a large homogeneous air sample used as a standard reference. The method was applied to hair samples from 80 men and 147 women, long-term residents of Los Alamos, NM, and 99 women, long-term residents of Pasadena, Calif. The geometric mean of the mercury concentration found in the hair samples was: Los Alamos, 18.0 micro g/gm (men) and 18.9 micro g/gm (women); Pasadena, 25.0 micro g/gm. Values ranged from 5 micro g/gm to over 100 micro g/gm. The mean values found are higher than previously reported. The results suggest that there may be differences in the environmental exposure of the two populations to mercury. (Jernigan-Vanderbilt)
W74-09759

INTERFERENCES IN THE DETERMINATION OF METALLIC ELEMENTS IN HUMAN HAIR, AN EVALUATION OF ZINC, COPPER, LEAD AND CADMIUM USING ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Cincinnati Univ., Ohio. Coll. of Medicine.
J. R. J. Sorenson, E. G. Melby, P. J. Nord, and H. G. Petering.
Archives of Environmental Health, Vol 27, No 1, p 36-39, July 1973. 3 tab, 11 ref.

Descriptors: *Heavy metals, Laboratory tests, *Analytical techniques, Human physiology, *Zinc, *Copper, *Lead, *Cadmium, Toxicity, Spectroscopy, Testing procedures, Contaminants, Public health, Pollutant identification.
Identifiers: *Human hair, *Atomic absorption spectroscopy.

Hair, a metabolic end product, has been used to indicate health status. The purposes in this study were: (1) to evaluate the hair digest matrix as a source of interferences in the determination of metals using atomic absorption spectrophotometry, and (2) to develop a technique whereby meaningful interlaboratory comparison of analytical data can be made. For hair analysis, interferences due to broad-band nonspecific molecular absorption, chemical ionization, flame emission, flame scatter, light scatter, and matrix matching can be avoided using ordinary methods and commercially available equipment. A technique is presented for the preparation of a standard reference hair sample. This standard reference hair was then used to demonstrate that concentrations of copper, zinc, lead and cadmium in a nitric acid hair digest matrix can be measured with precision and accuracy. (Jernigan-Vanderbilt)
W74-09760

AQUA REGIA FOR QUANTITATIVE RECOVERY OF MERCURIC SULFIDE FROM SEDIMENTS,
Michigan State Univ., East Lansing. Dept. of Crop and Soil Sciences.
L. W. Jacobs, and D. R. Keeney.
Environmental Science and Technology, Vol 8, No 3, p 267-268, March 1974. 1 tab, 6 ref.

Descriptors: *Mercury, *Sediments, *Water pollution sources, *Analytical techniques, Separation techniques, Chemical analysis, Organic compounds, Inorganic compounds, Digestion.
Identifiers: *Mercuric sulfide, *Aqua Regia, Quantitative recovery.

A digestion procedure consisting of a 2:1 concentration of sulfuric:nitric acids plus potassium permanganate and persulfate oxidation proved to be inadequate for quantitative recovery of HgS, a Hg compound that may be present in reduced materials such as river and lake sediments and waste sludges. Since HgS or Hg(II) associated with metal sulfide phases may be a significant fraction of the total Hg in these substances, incomplete dissolution of these Hg(II) sulfide phases during sample digestion will cause total Hg concentrations to be underestimated. An aqua regia digestion procedure which quantitatively recovers HgS

from sediments is described, and is recommended for total Hg analyses of sediments. Potassium permanganate and persulfate must be included with aqua regia to obtain complete recovery of five other Hg compounds implicated in Hg transformations and pollution in the environment. Nonaqua regia procedures being used to analyze sediments or sludges for total Hg should be tested for quantitative recovery of HgS. (Jernigan-Vanderbilt)
W74-09763

A NEW VANADYL (IV) THIOCYANATE METHOD FOR THE SPECTROPHOTOMETRIC DETERMINATION OF VANADIUM (IV),
Andhra Univ., Waltair (India). Dept. of Chemistry.
U. Muralikrishna, and K. V. Bapanaiah.
Current Science, Vol 42, No 13, p 460-461, July 5, 1973. 3 ref.

Descriptors: *Spectrophotometry, *Analytical techniques, Chemical analysis, Water quality, Heavy metals, Color reactions, *Trace elements, *Pollutant identification.
Identifiers: *Vanadium.

The extraction behavior of vanadyl thiocyanate complex with 8:3 n-butanol and ethyl acetate was studied. This method has the advantage of (1) 2-20 mg of vanadium can be estimated rapidly, and (2) tolerance to interference by common anions and larger reagent concentrations (50 to 100 fold). The extraction is quantitative and rapid (equilibium time is less than 30 sec) within the pH range of 0.5 to 2.5. Maximum absorption is at 730 nm wavelength. Interference with the method is caused by Fe(III), Mo(VI), Ni(II) and Cu(II). (Jernigan-Vanderbilt)
W74-09765

HEAVY ELEMENTS IN SURFACE MATERIALS: DETERMINATION BY ALPHA PARTICLE SCATTERING,
Chicago Univ., Ill. Enrico Fermi Inst.
T. E. Economou, W. A. Anderson, E. M. Blume, and A. L. Turkevich.
Science, Vol 181, p 156-158, July 1973. 2 fig, 1 tab, 6 ref.

Descriptors: *Heavy metals, *Lead, *Paints, *Toxicity, *Analytical techniques, Instrumentation, *Pollutant identification.
Identifiers: Surface materials, Alpha particle scattering.

The backscattering of alpha particles from a radioactive source can be used to determine the amounts of heavy elements such as lead in surface materials. A light, portable instrument has been constructed that can be used as a survey meter for painted surfaces. It was intended for use as a survey meter for lead detection by a semiskilled person. It can detect lead content of less than 0.3% in a surface paint in a measurement lasting a few minutes. One limiting characteristic of this instrument is that it provides information only about the top layer of the surface or just a few micrometers deep even if many layers of paint have been applied. The main components of the instrument are: (1) a source of alpha radioactivity that emits relatively monochromatic alpha particles and a negligible amount of harmful penetrating radiation such as gamma or x-rays; (2) a detector of the silicon surface-barrier type to register the number of backscattered alpha particles and their energy; (3) electronics consisting of a charge-sensitive preamplifier and amplifier for the signal from the detector, and a discriminator eliminating the signals from the alpha particles with low energies; and (4) a read-out system and timer. Values obtained compare favorably with those from conventional analysis. (Jernigan-Vanderbilt)
W74-09770

ISOLATION OF (BETA SUB 2)-MICROGLOBULIN FROM THE URINE OF PATIENTS WITH ITAI-ITAI (OUCH-OUCH) DISEASE,
National Inst. of Industrial Health, Kawasaki (Japan). Dept. of Occupational Diseases.
M. Ohsawa, and M. Kimura.
Experientia, Vol 29, No 5, p 556-558, 1973. 3 fig, 1 tab, 16 ref.

Descriptors: *Cadmium, *Proteins, *Human pathology, *Electrophoresis, *Urine, Laboratory tests, Analytical techniques, Testing procedures, Industrial wastes, Heavy metals, Pollutant identification, *Isolation.
Identifiers: *Proteinuria, Microglobulin.

This study shows that (Beta sub 2)-microglobulin can be isolated from the urine of patients with Itai-itai disease and that it is one of the main components in the proteinuria associated with this disease. In the experiment, 24 hour urine specimens were collected from female patients with Itai-itai disease. Urinary protein was determined by the biuret method according to Piscator's procedure. Urinary protein varied between 0.7 to 1.4 g per 24 h. Great quantities of Beta sub 2-microglobulin is excreted in the urine of patients with Itai-itai disease. Two distinguishable retinolbinding proteins giving the same mobility on disc electrophoresis as that of band 3, were also isolated preliminarily from the same urine. It was concluded from the findings on urinary low molecular weight proteins that proteinurea of Itai-itai disease is similar to the tubular one of chronic cadmium poisoning, but further work on urinary levels
this disease is required to explain the significance of this similarity. (Jernigan-Vanderbilt)
W74-09771

SIGNIFICANCE OF LEAD ISOTOPE COMPOSITION IN BLOOD,
Texas Univ., Dallas, Inst. for Geological Sciences.
W. I. Manton.
Nature, Vol 244, No 5412, p 165-167, July 1973. 5 fig, 1 tab, 9 ref.

Descriptors: *Lead, *Isotope studies, *Human pathology, Stable isotopes, Analytical techniques, Testing procedures, Mass spectrometry, Air pollution, *Texas, Distribution, *Pollutant identification.
Identifiers: *Blood, *Dallas(Tex).

Since blood sampling is the easiest means of conducting a large scale investigation of lead in the human body, the feasibility of such a program is studied. Measurements were made of the ratios of lead isotopes in the blood of residents, in particulate airborne lead and in emissions from two smelters in residential districts in southern Dallas. Tests indicated that lead in the blood ontinuously mixes with a large reservoir of lead elsewhere in the body, presumably the skeleton. Since it can be demonstrated that long response times are consistent with available data regarding the daily uptake and body burden of lead, it appears that the same number of atoms of lead as enter the blood each day, are removed in the urine, maintaining the total number of atoms of lead in the body constant. Isotope tracer studies to measure the uptake of lead from pollutants are best attempted on children, because, as a child grows and his bones calcify, lead moves from his blood into his skeleton. The isotope ratios of lead in his blood will therefore be fairly representive of the lead to which he has been exposed, irrespective of any exchange of isotopes with the skeleton. (Jernigan-Vanderbilt)
W74-09772

MERCURY IN WATER: AN EVALUATION OF LABORATORIES AND METHODOLOGY,
California State Dept. of Public Health, Berkeley. Sanitation and Radiation Lab.
A. E. Greenberg, J. Thomas, and B. R. Tamplin.
Journal of the American Water Works Association, Vol 65, No 8, p 552-554, August 1973. 1 tab, 8 ref.

Descriptors: *Analytical techniques, *Spectroscopy, *Mercury, *Public health, Laboratory tests, Water quality, California, Colorimetry, Potable water, Water analysis, Pollutant identification.
Identifiers: *Inter-laboratory comparisons, Atomic absorption spectroscopy, Accuracy.

Each of seven labs received a set of fourteen randomly coded water samples with specific amounts of mercury. These samples consisted of four natural waters from community samples, one doubly-distilled blank, three samples containing 4 micrograms/l, and two samples containing 6 micrograms/l. Three labs used the flameless atomic absorption technique (one also used crystal violet colorimetric technique), two others used colorimetric technique (crystal violet, and dithizone), one used a wide-band Hg analyzer and the last used a dithizone field kit. Results from the lab which used the field-test-kit dithizone method were unacceptably high, bore no relationships to the results of the other laboratories and were therefore excluded from further consideration. Resports of the other labs were relatively consistent. The best results, in terms of accuracy and precision, were obtained with flameless atomic-absorption. The results attained with the crystal violet procedure were acceptable but less precise and accurate than atomic-absorption, and the dithizone method was still less satisfactory. (Jernigan-Vanderbilt)
W74-09774

of these proteins in

QUANTITATIVE SEPARATION OF MAGNESIUM AND PALLADIUM FROM NUMEROUS METAL IONS ON TITANIUM TUNGSTATE PAPERS BY ELECTROCHROMATOGRAPHY,
Aligarh Muslim Univ. (India). Dept. of Chemistry.
M. Qureshi, K. G. Varshney, and F. Khan.
Separation Science, Vol 6, No 4, p 559-572, August 1971. 8 tab, 12 ref.

Descriptors: *Chromatography, *Separation techniques, *Electrolytes, *Cations, Metals, *Electrochemistry, Analytical techniques, Spectrophotometry, Ions, Ion exchange, Chemical reactions, Laboratory tests, *Magnesium, *Pollutant identification.
Identifiers: *Palladium.

Electrochromatography was performed on 46 metal ions in 15 electrolytes on papers impregnated with titanium tungstate by applying different electrical potentials and allowing different time intervals for migration. On the basis of the differential mobility of the cations, which depend on the nature of the complexes formed with the background electrolytes and the ion exchange properties of titanium tungstate, a large number of binary and ternary separations were achieved. The separations of one metal ion from numerous metal ions were also accomplished. In removal of magnesium from titanium tungstate papers 5% NCl proved to be the ideal eluting solvent. Elution of palladium was possible from wet paper with 40 ml of 10% HCl. Cleaner and faster separation of metal ions tested depended on the ion exchange paper and on the background electrolyte. (Jerome-Vanderbilt)
W74-09782

STUDIES OF SOLVENT EXTRACTION BEHAVIOR OF SOME DIVALENT METALS WITH LIQUID ION-EXCHANGER,
Palli Siksha Sadana, Sriniketan (India). Dept. of Chemistry.
A. K. De, and U. S. Ray.
Separation Science, Vol 6, No 3, p 443-450, June 1971. 2 fig, 2 tab, 3 ref.

Descriptors: *Solvent extractions, *Heavy metals, *Ions, *Ion exchange, Analytical techniques, Separation techniques, Testing procedures, Laboratory tests, Acids, Measurement, *Pollutant identification.
Identifiers: Divalent metals.

A systematic study of the comparative extraction behavior of aqueous solutions of some divalent metals was carried out with a high molecular weight carboxylic acid, SRS-100, with benzene used as a diluent. The study includes the extraction behavior as a function of pH, effect of diluent, metal ion concentration, solvent concentration, and interference of the associated elements. In almost all cases nearly quantitative extraction was achieved. The proposed method is simple, rapid, and applicable both at micro and macro levels. The method is applicable to extraction of metal ions in the presence of other commonly interfering ions at milligram levels. Metals examined include Fe, Zn, Cd, Hg, Pb, Pd, Mg, Ca, Sr, and Ba. (Jerome-Vanderbilt)
W74-09783

ZINC AND CADMIUM IN NORMAL HUMAN EMBRYOS AND FETUSES, ANALYSES BY ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Inst. of Rehabilitation Medicine. Univ. Medical Center, N.Y.
For primary bibliographic entry see Field 5C.
W74-09785

THE FLUOROMETRIC DETERMINATION OF SELENIUM: A LITERATURE REVIEW.
Fluorometry Reviews, G. K. Turner Associates, Palo Alto, California, September, 1972. 4 p, 25 ref.

Descriptors: *Fluorometry, *Trace elements, *Testing procedures, Toxicity, Laboratory tests, *Reviews, Organic matter.
Identifiers: *Selenium.

Since selenium is one of the essential trace elements, it is important to be able to measure very low concentrations of selenium in animal tissues, in soils, and especially in feeds - to determine that the necessary amount is present without reaching toxic levels. Large amounts of selenium can be assayed by gravimetric determinations, titrations, and colorimetric methods. In 1960 Cousins reported a fluorometric method for measuring selenium yielding increased sensitivity. A typical fluorometric procedure is presented in detail. Selenium in the form of selenite reacts with aromatic ortho-diamines to form piazselenols which fluoresce in certain organic solvents. With biological specimens, the sample must first be ashed under strong oxidizing conditions. The inorganic selenium is isolated and converted to the IV oxidation state. It is then reacted with the ortho-diamine and the piazselenol is extracted into a suitable organic solvent for measurement. Modifications depending on the type of sample which are discussed include digestion methods (wet or combustion with oxygen), removal of interfering substances either by separation of selenium or masking the interference, and choice of reagent for the production of fluorescence. Filters for use in the fluorometer for measurement are mentioned. (Jernigan-Vanderbilt)
W74-09792

5B. Sources Of Pollution

BIOLOGICAL DEGRADATION OF HYDROCARBONS IN WATER,
Rhode Island Univ., Kingston. Dept. of Microbiology.
C. W. Houston.
Available from the National Technical Information Service as PB-233 438, $3.25 in paper copy, $1.45 in microfiche. Completion Report, (1974). 31 p, 14 fig, 2 tab, 6 ref. OWRR B-033-RI(1). 14-31-0001-3640.

Descriptors: *Organic compounds, Pseudomonas, *Growth rates, *Mass transfer, *Biodegradation, Pollution, Kinetics, Mathematical models.
Identifiers: *Heptane, *Pseudomonas aeruginoss.

The growth of Pseudomonas aeruginoss on n-heptane was found to be exponential only at low cell concentrations (1 gm/l). The change from exponential to linear growth rate occurs when dissolved oxygen is well above the critical value. The data fit the mathematical model for homogeneous kinetics developed by Dunn in 1958. They suggest that heptane is used in dissolved form rather than by direct contact between microorganism and hydrocarbon droplet. A decrease in interfacial tension during growth is attributed to the production of a surface tension depressant by the organism. Increased solubility of the hydrocarbon as a result of its production may account for the high growth rate observed on this substrate of low solubility.
W74-09254

SEASONAL VARIATIONS IN THE TRITIUM ACTIVITY OF RUN-OFF FROM AN ALPINE GLACIER (KESSELWANDFERNER, OETZTAL ALPS, AUSTRIA),
Innsbruck Univ. (Austria). Dept. of Physics.
For primary bibliographic entry see Field 2C.
W74-09341

ECOLOGICAL INVESTIGATION OF EUBACTERIA AND ACTINOMYCETES IN AQUATIC AND TERRESTRIAL BIOTOPES OF CROATIA (IN SERBO-CROATIAN),
Institut za Botaniku, Zagreb (Yugoslavia).
Z. Pavletic, and B. Stilinovic.
Acta Biol Iugosl Ser B Mikrobiol, Vol 8, No 1, p 77-84, 1971, English summary.
Identifiers: *Actinomycetes, Adriatic coast, Bacteria, *Biotopes, Ecological studies, *Eubacteria, Fungi, Rivers, Sea, Soils, Springs, Streptomyces-fradiae, *Yugoslavia(Croatia), *Heterotrophic bacteria.

A review of research on the ecology of bacteria in Croatia is given. Rivers, hot springs, the sea and soils were investigated. The rivers of the continental Korana (including Plitivice lakes), Mreznica and Sava regions and the entire course of the river Mirna in Istria were examined for total numbers of heterotrophic bacteria and most probable number of coliforms. In the Tuhelj hot springs, actinomycetes from thermal mud had very high antimicrobial activity due to a race of Actinomyces (Streptomyces) fradiae. The bacteria in seawater determined at about 20 points in the bay of Rijeka, between the cities of Selce and Plomin were examined and the occurrence of a number of heterotrophic bacteria and coliforms was noted both along the coast and in open sea in winter. Detailed research on actinomycetes in continental and littoral soils of Medjimurje in N. Croatia, Medvednica Mountain, the region around Zagreb, the eastern region of Slavonia, the southern region of Gorski Kotar, Istria, the Croatian Adriatic coast, the littoral region of Dalmatia and the islands of Krk, Rab, Pag, Dugi, Kornati, Prvic, Kolocep and Lopud was conducted. Actinomycetes in specific types of soils and their relationship to other bacteria and fungi, and antagonistic races of actinomycetes and their relationship to soil type and vegetation were studied.--Copyright 1974, Biological Abstracts, Inc.
W74-09351

EFFECTS OF SALINITY AND SUSPENDED SEDIMENT ON TURBULENT DIFFUSION OF POLLUTANT IN PUERTO RICO,
Puerto Rico Univ., Mayaguez. Dept. of Civil Engineering.
C. Y. Kuo.
Available from the National Technical Information Service as PB-233 365, $3.25 in paper copy, $1.45 in microfiche. Completion Report UPRICO-WRRI-PR-73-74, Puerto Rico Water Resources Research Institute, Mayaguez, December 1973. 29 p, 13 fig, 7 tab, 3 ref. OWRR A-034-PR(1).

Descriptors: Streams, Estuaries, Bays, Pollutants, Municipal wastes, Industrial wastes, *Sediments, Suspension, *Salinity, *Turbulence, *Diffusion, Water pollution control, *Puerto Rico, Diffusivity, *Path of pollutants, Sugarcane, Turbulent flow, Dispersion.
Identifiers: Sugarcane wastes.

Due to the spatial variation of salinity in estuaries and coastal waters, a study was made in the laboratory of the molecular and the turbulent diffusion process in fluid media with various salinity. Dye diffusions were performed in salt water of known concentrations to simulate the dispersion of pollutant in tidal waters. Both the turbulent and the molecular diffusion coefficient increase as the salinity increases. The variation of the turbulent diffusion coefficient is approximately linear with respect to the salinity. However, the molecular diffusion coefficient tends to charge non-linearly with the salinity. The turbulent diffusion rate is rather uniform with comparison to the molecular diffusion rate.
W74-09362

BIOLOGY, DISTRIBUTION, IMPORTANCE AND CONTROL OF DEER FLIES AND HORSE FLIES (DIPTERA:TABANIDE) IN WATER-ORIENTED RECREATIONAL AREAS,
Clemson Univ., S.C. Dept. of Entomology and Economic Zoology.
For primary bibliographic entry see Field 5G.
W74-09363

HYDROGEOLOGY OF THE FORMATION AND NEUTRALIZATION OF ACID WATERS DRAINING FROM UNDERGROUND COAL MINES OF WESTERN MARYLAND,
Geological Survey, Parkville, Md.
E. F. Hollyday, and S. W. McKenzie.
Maryland Geological Survey Report of Investigations No 20, 1973. 50 p, 16 fig, 8 tab, 71 ref.

Descriptors: *Acid mine water, *Hydrogeology, *Neutralization, *Maryland, Coal mines, Mine acids, Path of pollutants, Water quality, Water chemistry, Water pollution control, *Mine drainage.

The flows from 18 underground mines for which mine maps are available in the bituminous coal basins of western Maryland were measured, and water samples were collected for determination of 27 major dissolved constituents and chemical properties and 28 minor elements. Natural neutralization is taking place in the underground environment and the most nearly neutralized acid mine drainage is associated with flow from an upper mine to a lower mine through the intervening rock strata. (Knapp-USGS)
W74-09369

GEOLOGIC ASPECTS OF LANDFILL REFUSE DISPOSAL,
Louisville Univ., Kentucky. Dept. of Civil Engineering.
D. J. Hagerty, and J. L. Pavoni.
Engineering Geology, Vol 7, No 3, p 219-229, December 1973. 3 tab, 28 ref.

Descriptors: *Landfills, *Garbage dumps, *Leaching, Water pollution effects, *Path of pollutants, Water pollution control, Hydrogeology, Aquifer characteristics, Water quality, Water chemistry.

The decomposition of solid waste materials in sanitary landfills produces liquids and gases which are deleterious to human beings, animals, plants and inorganic geologic materials. Leachate characteristics and the effect of leachate on groundwater quality and carbonate strata are discussed. A system for site evaluation for purposes of sanitary landfill is presented. The characteristics of the soil and rock at a site are included in the evaluation system through assessment of their infiltration potential, permeability, filtering capability and ab-

sorption potential. The characteristics of the groundwater at a site are taken into consideration through assessment of the substrate potential, buffering capacity and distributive potential for contaminants. Formulae are given which allow determination of evaluation parameters, and an example of the application of the rating system is presented. Use of the site-evaluation system will improve the quality of site selection and will reduce contamination and pollution problems created by construction of refuse landfills at unsuitable locations. (Knapp-USGS)
W74-09375

THE COOPER RIVER ENVIRONMENTAL STUDY.
For primary bibliographic entry see Field 2L.
W74-09379

WATER QUALITY PORTION OF THE COOPER RIVER ENVIRONMENTAL STUDY.
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
In: Cooper River Environmental Study. South Carolina Water Resources State Water Plan Report, No 117, p 64-103L, April 1974. 8 fig, 12 tab, 6 ref.

Descriptors: *Estuaries, *South Carolina, *Saline water intrusion, *Flow control, Path of pollutants, Stratified flow, Streamflow, Discharge(Water).
Identifiers: *Cooper River(SC), *Charleston Harbor(SC).

A multi-agency study of the Cooper River, South Carolina includes physical, chemical, and biological investigations both before and during a controlled, reduced flow period. By comparing the October study data (representing a high flow condition) to the November study data (representing a controlled reduced flow condition), some of the effects of proposed rediversion can be demonstrated. Daily flow to the Cooper River from Lake Moultrie averaged 20,550 cfs during the October study and 3,000 cfs during the November study period. Water temperature averaged 21.5 deg C during the October study and 17.9 deg C during the November study. Dissolved oxygen concentrations ranged from 3.4 mg/liter at mile 16.5 to 8.4 mg/liter at mile 44.2 during October and 5.0 mg/liter at mile 44.2 during the November study. Average dissolved oxygen concentrations were not significantly different between the October and November study periods. During October, percent saturation values for dissolved oxygen ranged from 70.7 to 88.1 and 71.8 to 92.6 percent for high and low slack tide, respectively (surface and bottom samples averaged). Percent saturation values for dissolved oxygen at reduced river flow (November) ranged from 69.7 to 89.7 percent and 71.6 to 90.8 percent for high and low slack tide, respectively. (See also W74-09379) (Knapp-USGS)
W74-09385

SURFACE WATER HYDRAULICS.
For primary bibliographic entry see Field 2L.
W74-09387

THE EFFECT OF PROPOSED DEEPENING OF THE JOHN F. BALDWIN AND STOCKTON SHIP CHANNELS ON SALT-WATER INTRUSION, SUISUN BAY AND SACRAMENTO-SAN JOAQUIN DELTA AREAS, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
J. P. Akers.
Water-Resources Investigations 56-73, March 1974. 10 p, 2 fig, 1 tab, 2 ref.

Descriptors: *Saline water intrusion, *Dredging, *California, *Surface-groundwater relationships, Channel improvement, Bays, Navigation.
Identifiers: *Suisun Bay(Calif), Sacramento-San Joaquin Delta(Calif).

The natural channel adjacent to the reach of the John F. Baldwin and Stockton ship channels between the Benicia-Martinez bridge and False River, California has been deeper than the authorized 36-ft depth. A considerable part of the reach has been deeper than the 47-ft depth authorized for the ship channel in Suisun Bay. Thus, most of the permeable strata that immediately underlie the alinement of the proposed improved channel probably already are saturated with saltwater and the proposed channel deepening will not change their present water-quality regimen. (Knapp-USGS)
W74-09408

SURVEY OF ENVIRONMENTAL RADIOACTIVITY, (JANUARY 1973-DECEMBER 1973).
Minnesota Dept. of Health, Minneapolis.
For primary bibliographic entry see Field 5A.
W74-09431

PHOSPHORUS STUDIES IN LOWER GREEN BAY, LAKE MICHIGAN,
Wisconsin Univ., Madison. Dept. of Water Chemistry.
For primary bibliographic entry see Field 5C.
W74-09435

KINETICS OF SUBSTRATE ASSIMILATION AND PRODUCT FORMATION IN ANAEROBIC DIGESTION,
Institute of Gas Technology, Chicago, Ill. Div. of Bioengineering Research.
S. Ghosh, and F. G. Pohland.
Journal Water Pollution Control Federation, Vol 46, No 4, p 748-759, April 1974. 10 fig, 2 tab, 16 ref.

Descriptors: *Anaerobic digestion, *Kinetics, *Biodegradation, *Mathematical models, *Waste water treatment, *Model studies, Microorganisms, Anaerobic bacteria, Digestion, Wastes, Methane, Acids, Bacteria, Chemical reactions, Sludge digestion, Organic loading, Carbohydrates, Organic compounds, Gases, Fermentation.
Identifiers: Acetic acid, Volatile acids, Butyric acid, Propionic acid, Glucose.

Several kinetic process models are capable of describing the concentrations and production velocities of the various acidic products and gases from an anaerobic digester. Analytical techniques for determining the appropriate kinetic constants of such mathematical models are presented. A number of growth kinetic constants applicable to dominant cultures of acid and methane formers were determined from experimental data. Comparison of the generation times of 4.8 and 0.56 hr for the methane and acid formers, respectively, confirmed the common assumption that methane formation was the rate-limiting step in anaerobic digestion of soluble wastes. Acid fermentation of glucose substrate showed that the yield of acetic acid from glucose was the highest, followed by propionic and butyric acids. (Witt-IPC)
W74-09440

AEROBIC BIODEGRADATION OF CARBOXYMETHYLCELLULOSE,
Hercules Research Center, Wilmington, Del.
M. G. Wirick.
Journal Water Pollution Control Federation, Vol 46, No 3, p 512-521, March 1974. 2 fig, 6 tab, 21 ref.

Descriptors: *Chemical wastes, *Cellulose, *Biodegradation, Aerobic conditions, Organic compounds, *Industrial wastes, Degradation, Ethers, Analytical techniques, Environmental effects, Bacteria, Carbohydrates, Chemical industry, Pulp and paper industry, Additives, Colloids.
Identifiers: *Carboxymethylcellulose, Cellulose ethers, Cellulose derivatives, Thickeners(Viscosity regulators).

Carboxymethylcellulose (CMC) is a versatile hydrophilic colloid possessing considerable thickening power. Its annual U.S. production of approximately 65 million pounds is used in many fields, including adhesives, coatings, cosmetics, detergents, foods, paper, petroleum, pharmaceuticals, and textiles. Because it is completely water-soluble in nearly all of its applications, it eventually finds its way into waste streams, and ultimately into surface water. Although it is nontoxic and is permitted in potable water in concentrations up to 1 mg/liter, predictions concerning its long-range effect on the environment require knowledge of its biodegradability. Thus, two purified CMC samples, CMC-4 and CMC-7 (degrees of substitution 0.41 and 0.71, resp.) were exposed to the action of waste water bacteria in a static air-saturated culture medium. After a week, residual substrate concentrations were determined by two analytical procedures, one specific for the substituent groups and the other sensitive to the carbohydrate portion of molecular chains. Adaptive transfers were then made to fresh solutions, and the process repeated until the percentage degradation stabilized. The rate of biochemical oxidation of CMC-4 maximized at about 80% in 1 week, whereas acclimation of CMC-7 was not complete until the end of the 16th week, when a biodegradation rate of about 60%/week was reached. Microbial attack was more rapid for unsubstituted than for substituted anhydroglucose units. (Witt-IPC)
W74-09442

ON SPENT OF LIQUOR SEMICHEMICAL PULPING. PART III. TOXICITY CHARACTERISTICS OF SCP SPENT LIQUOR AND REDUCTION OF THE TOXICITY (IN JAPANESE),
Kyushu Univ., Fukuoka (Japan). Wood chemistry Lab.
For primary bibliographic entry see Field 5C.
W74-09454

A BENTHOS SURVEY (1972) IN THE NORTH SASKATCHEWAN RIVER IN THE VICINITY OF THE PRINCE ALBERT PULP COMPANY, PRINCE ALBERT, SASKATCHEWAN,
Department of the Environment, Winnipeg (Manitoba). Fisheries and Marine Service.
For primary bibliographic entry see Field 5C.
W74-09459

BENTHOS STUDIES (1971 AND 1972) ON THE WINNIPEG RIVER IN THE VICINITY OF THE ABITIBI MANITOBA PAPER COMPANY, PINE FALLS, MANITOBA,
Department of the Environment, Winnipeg (Manitoba). Fisheries and Marine Service.
For primary bibliographic entry see Field 5C.
W74-09460

BIOLOGICAL MONITORING OF THE FRASER RIVER NEAR PRINCE GEORGE, B.C.,
Beak (T.W.) Consultants Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 5C.
W74-09463

WASTE WATER LOADS AND THEIR POSSIBLE REDUCTIONS IN THE FINNISH FOREST INDUSTRY (SUOMEN METSAETEOLLISUUDEN JAETIEVESIKUORMITUS JA SEN KEHITYSNAEKMAT),
Finnish National Water Board, Helsinki.
H. Nilsen.
Paperi ja Puu (Papper och Tra), Vol 55, No 11, p 845-848, 851-852, Nov, 1973. 12 tab.

Descriptors: *Water consumption, *Pulp and paper industry, *Pulp wastes, *Water pollution sources, Europe, *Organic loading, Suspended solids, Biochemical oxygen demand, Discharge(Water), Waste water(Pollution).

Identifiers: *Finland, Forest products industries, Pulp mills, Paper mills, Board(Paperboard), Mills, Fiberboard(Building board) mills, Kraft mills.

In 1972 the Finnish forest products industries produced 6,283,000 t of pulp., 4,695,000 t of paper and paperboard, and 260,000 t of fiber insulation boards. Locations of various mills are discussed in relation to their water consumptions and the characteristics of discharged polluted waste waters. Pollution loads caused by different manufacturing processes are compared. The total waste water load discharged in 1972 was 1328 t of BOD and 822 t of suspended solids per 24 hr. Depending on the process and products, these figures varied from 10 to 169 kg of BOD and 16 to 131 kg of suspended solids per ton of product, while specific water consumptions varied from 45 to 579 cu m per ton. Compared to overall Eurpean industry figures, on the average, Finland used more water, lost more solids in pulp production, and discharged greater BOD loads in kraft pulp manufacture. Current methods for reducing effluent loadings are reviewed. The National Water Board of Finland has set of 1980 taget for 50% BOD reduction and 80% solids load reduction, compared to 1970 data. (Brown-IPC)
W74-09465

PATHOGENIC ORGANISMS IN THE MURDERKILL RIVER ESTUARY,
Delaware Univ., Newark. Dept. of Biological Sciences.
E. De Michele.
Journal Water Pollution Control Federation, Vol 46, No 4, p 772-776, April, 1974. 4 fig, 1 tab, 6 ref.

Descriptors: *Pathogenic bacteria, *Aquatic microorganisms, *Waste water treatment, Rivers, *Water pollution, *Delaware, Coliforms, Streptococcus, Water pollution sources, Microorganisms, Water quality, Wastes, Animal wastes, Bacteria, Aquatic microbiology, Discharge(Water), Flow rates, Farm wastes, Freshwater, Water types, Treatment facilities.
Identifiers: *Murderkill River estuary(Del), Kent County(Del).

The Murderkill River is a partial tidal body of water located in Kent County, Delaware, with summer monthly mean freshwater discharges ranging from 17 to 29 cu ft/sec (28.9 to 49.3 cu m/min) at a point coincident with the effluent discharge from the Kent County Regional Wastewater Treatment Plant. Indicator bacterial concentrations were determined over 6 summers to characterize river conditions before startup of the 10 million gal/day (37,850 cu m/day) plant. Of all fecal coliform (FC) concentrations, 45% were greater than 200/100 ml, while 90% of all fecal streptococcus (FS) values exceeded 200/100 ml. The FC:FS ratio always was less than 4.0, with 90% of all values less than 0.7, indicating that the principal sources of pollution probably are animal wastes. (Witt-IPC)
W74-09466

CHLORIDE AND LEAD IN URBAN SNOW,
Department of the Environment, Ottawa (Ontario). Water Quality Div.
B. G. Oliver, J. B. Milne, and N. LaBarre.
Journal Water Pollution Control Federation, Vol 46, No 4, p 766-771, April, 1974. 5 tab, 24 ref.

Descriptors: *Sodium chloride, *Chlorides, *Lead, *Snow, *Urban runoff, Rivers, *Water pollution sources, Water quality, Water pollution, Snowmelt, Gasoline, Water pollution sources, Pollutants, Sodium chloride, Salts, *Canada, Runoff, Deicers, Snow removal.
Identifiers: Leaded gasoline, Ottawa(Ontario).

The chloride and lead concentrations of snow and runoff in Ottawa were determined in order to assess whether snow melting and snow disposal practices were adversely affecting the water of local rivers. The use of sodium chloride for road deicing was shown to increase chloride levels substantially in area rivers. A portion of the lead associated with the burning of leaded gasolines could be traced in the rivers. A considerable reduction of lead input to the rivers could be accomplished by maintaining snow disposal sites away from watercourses and flood plains. (Witt-IPC)
W74-09468

STUDY OF THE DIFFUSION OF THE DEEP SEA DISPOSAL OF RESIDUAL WATER,
M. Aubert, J. Aubert, and J. P. Breittmayer.
Rev Int Oceanogr Med. 29. p 31-52, 1973. Illus. (English summary).
Identifiers: *Bacteria, *Diffusion, *France(Nice), Residual water, Sea water, Waste waters, *Outfalls, *Waste disposal, Path of pollutants.

The basic formula established by Aubert and Desirotte was verified by the construction of outlets. This formula was pessimistic but valid for the evaluation of the bacterial upper limit. The bacterial decrease may be calculated in the case of the outlet of Nice (France) which discharges 2 to 3 cube m/sec. The outlets showed the importance of the thermocline in wastewater dynamics.--Copyright 1974, Biological Abstracts, Inc.
W74-09472

PLATING POLLUTION: THE LATEST FROM EPA, PART 1,
Products Finishing, Vol 38, No 7, p 141-144, April, 1974. 1 tab.

Descriptors: *Standards, Water pollution sources, *Water utilization, *Industrial water, *Waste water treatment, Pollution abatement.
Identifiers: *Electroplating industry.

The stringent limitations proposed by the Environmental Protection Agency on the electroplating industry were discussed at an American Electroplaters' Society seminar. The proposals made by the EPA require that a plater discharge no more than a stated weight of any contaminant for each unit of surface area he plates. The platers must limit concentrations of contaminants in the rinse water to 1.0 mg/liter or less, depending upon the constituent (except for suspended solids). Few, if any, of the pollution control authorities in the electroplating industry believe that the combination of low water usage and low concentrations can be achieved by production plants. The basis for the proposed regulations is a Battelle Memorial Institute study which estimated that a water use of 80 liter/sq m could generally be attained. (Merritt - FIRL)
W74-09491

ENVIRONMENTAL HAZARDS OF NUCLEAR WASTES,
P.P. Micklin.
Science and Public Affairs, Vol 30, No 4, p 36-42, April, 1974. 1 fig, 29 ref.

Descriptors: *Management, *Nuclear wastes, *Radioactive waste disposal, Radioactive wastes, Waste storage, Liquid wastes, Storage tanks, Underground storage, Dead storage, Geological formations.

The management and storage of nuclear wastes are discussed. Krypton-85, cesium-137, and strontium-90 present the greatest management problems because of their long physical half-lives. Because of their highly radioactive content, reactor wastes must be isolated from the biosphere for centuries or longer. The greatest quantity of high level wastes, approximately 85 million gallons, is contained at three federal repositories. Although not presently posing a serious storage problem, these high level radioactive wastes are expected to reach 93 million gallons by the year 2000. Commercial wastes are a more serious problem because they can attain heat and radioactivity levels six times greater per unit of volume. Tank storage has been satisfactory so far, but salt formations are preferred for permanent disposal of commercial high level radioactive wastes since they are dry and impervious to water. Other possible modes of earth disposal include burial deep within other geologic formations, on the seabed and within continental ice sheets. (Merritt - FIRL)
W74-09502

COMPARING EFFLUENT RELEASES FROM NUCLEAR AND FOSSILFUELED POWER PLANTS,
Brookhaven National Lab., Upton, N.Y. Health Physics and Safety Div.
A. P. Hull.
Nuclear News, Vol 17, No 5, p 51-55, April, 1974. 12 fig, 2 tab, 21 ref.

Descriptors: *Air pollution, *Nuclear powerplants, *Fossil fuels, Gases, Halogens, Particulates, Corrosion, Radioactive wastes, *Water pollution sources, Water pollution effects.
Identifiers: Liquid fission.

Airborne effluent releases from nuclear power plants are compared to those from fossil fueled power plants. Yearly overall average amounts of gaseous, halogen and particulate, liquid fission and corrosion products, and tritium activity from 1967 to 1972 have been calculated and are tabulated. Data for similar comparisons of conventional radioactivity and pollutants in liquid effluents are not available. However, studies to date in the vicinity of several nuclear power reactors suggest that their radioactive liquid effluents have been dosimetrically insignificant. Comparable studies of the degree of pollution of streams and groundwater by releases peculiar to fossil fueled plants have not appeared in the literature, so it also appears to be minimal. (Merritt - FIRL)
W74-09503

CORRELATION BETWEEN TURBIDITY AND IRON CONTENT OF THE FILTER EFFLUENT OF WELL ORIGIN,
Yugoslav Dept. of Water Treatment Plant Automation, Belgrade.
A. Filip, and B. Vuskovic.
Journal American Water Works Association, Vol 66, No 3, p 166-168, March, 1974. 5 fig, 2 ref.

Descriptors: *Wells, Groundwater, *Turbidity, Water quality, *Iron, *Iron compounds, *Filters.
Identifiers: Filter effluent, *Turbidimeter, Iron trace analyzer.

The investigation had a twofold purpose: First, to check the already known dependence of filter-effluent quality on filter age as well as the steady-state operation, and second, to define the correlation between turbidity and iron content in the filter effluent. The experiments were performed with iron trace analyzer and low-range turbidimeter, and turbidity and iron content were shown to be highly correlated. Additionally, the experiments have proven that the turbidimeter and iron analyzer can be used for continuous monitoring of the filter effluent of well-origin water, except when there are iron compounds present or when there is any solid phase other than insoluble iron compounds suspended in the water. Comparing these two types of instruments reveals that turbidimeters are preferable because they have shorter time constants, are less expensive, and are easier to operate and maintain. (Campbell-NWWA)
W74-09526

DIGGING INTO MINE WASTE.
Environmental Science and Technology, Vol 8, No 2, p 110-111, February 1974. 2 fig.

Descriptors: *Mine wastes, *Mine water, *Mine acids, Talus, Pollutants, Pollution abatement, Waste disposal, Mine drainage.
Identifiers: Tailings, Mound stabilization.

The Department of the Interior projects that by the year 2000, more than 30 million acres in the U.S. will be affected by mining operations. The disposal of the solid waste, and the treatment of polluting mine waters from large scale operations represents a major threat to the environment. Acid or alkaline mine waters created by the disruption of stable aquifer and stream systems must be neutralized if possible. In those mining operations where water plays an integral part in the mining operations, it must be cleared before it is discharged. Solid wastes in the form of tailings represent a major eyesore and a potential pollutant of air and water. The immediate problem with solid mine wastes is to stabilize them against dusting and slumping. Using solid mine waste as a raw material is another approach in dealing with spoil piles. In the future, mine tailings might be used as a growing medium for grasses and brush after being disposed of in low-lying areas. New innovative approaches to surface mining that minimize environmental disturbance are needed for future mining operations. (Martino-NWWA)
W74-09531

SUBSURFACE DISPOSAL OF WASTE IN CANADA, INJECTION OF LIQUID WASTES IN DEEP WELLS, A PRELIMINARY APPRAISAL,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
R. O. Van Everdingen, and R. A. Freeze.
Technical Bulletin No. 39, 1971. 64 p, 7 fig, 3 tab, 4 append.

Descriptors: *Waste disposal, *Underground waste disposal, *Injection wells, *Canada, Water pollution sources, Liquid wastes.
Identifiers: *Subsurface disposal, Disposal sites.

A general appraisal is presented of the principal limitations of the potential of subsurface disposal. A discussion of the qualification of waste for subsurface disposal is followed by a review of the criteria to be applied for the proper selection of disposal regions, sites and geologic formations, and chapters on subsurface facilities and their potential failures. After a review of the method in Canada, requirements in the field of legislation and regulation are outlined, followed by a discussion of those aspects of the methods that are in need of further research. (Martino-NWWA)
W74-09536

PREVENTING LANDFILL LEACHATE CONTAMINATION OF WATER,
Gulf South Research Inst., Baton Rouge, La.
For primary bibliographic entry see Field 5G.
W74-09539

BACTERIOLOGICAL WATER QUALITY AND INCIDENCE OF WATERBORNE DISEASES IN A RURAL POPULATION,
S. N. Medical Coll., Agra (India).
For primary bibliographic entry see Field 5C.
W74-09540

ON THE CHARACTERIZATION OF THE PARASITE FAUNA OF YELLOW PERCH (PERCA FLUVIATILIS L.) IN FIVE LAKES, IN SOUTHERN ONTARIO, CANADA,
Waterloo Univ. (Ontario). Dept. of Biology.
S. Tedla, and G. H. Fernando.
Helminthologia (Bratisl), 11. p 23-33, 1970.
Identifiers: Acanthocephala, *Canada, Cestoda, Copepoda, Digenea, Fauna, Hirudinea, Lakes, Monogenea, Nematoda, Pelecypoda, Perca-fluviatilis, *Yellow perch, *Fish parasites.

Monogenea, Digenea, Cestoda, Nematoda, Acanthocephala, Pelecypoda, Hirudinea and Copepoda parasites were found in the yellow perch in the Bay of Quinte, Lake Opeongo, Lake on the Mountain, Sunfish Lake and Belwood Lake. The problem of composition of the parasite fauna cannot be assessed fully on the evidence of the parasite fauna of any 1 species of fish or 1 water body.--Copyright 1973, Biological Abstracts, Inc.
W74-09541

WATER SUPPLY IMPROVEMENT PROJECT,
Ohio Dept. of Health, Columbus. Div. of Sanitation.
J. D. Daulton, and D. E. Kos.
Appalachian Regional Commission, Final Report, 1973. 165 p, 73 fig, 36 tab, 27 ref, 6 append. Grant 05H 00009401, ARC 202 funding.

Descriptors: Sampling, Water pollution sources, *Water supply, Sewage treatment, *Ohio.
Identifiers: *Community hygiene, Health planning, Environmental health.

Preliminary results are presented of a survey of private water supplies in seven counties served by the Ohio Valley Health Services Foundation. These counties include: Athens, Gallia, Hocking, Jackson, Lawrence, Meigs, and Vinton. The project was a voluntary program of sampling and collection of information regarding the private water developments in the area. Data were collected and stored on computer print-outs and tapes for future reference. It was found that 48.3% of the water supplies tested positive for coliform bacteria and therefore, were considered unsafe. The random distribution of the safe and unsafe water samples are interpreted to mean that groundwater pollution is not the principal cause for unsafe water. Sampled water supplies analyzed for nitrates were found to be less than the Public Health Service recommended maximum of 45 mg/l. (Campbell-NWWA)
W74-09542

GROUNDWATER QUALITY. DOOR COUNTY, WISCONSIN.
Wisconsin Univ., Madison. Inst. for Environmental Studies.
Report 7, May 1973. 215 p, 9 fig, 33 tab, 13 plates, 16 ref.

Descriptors: *Groundwater, *Water quality, *Economic impact, *Recreation, *Wisconsin, Institutional constraints, Physical properties, Social aspects, Land use, Public health, Legislation, Waste water disposal, Septic tanks, Water supply, Control, Regional development, Environmental effects, Economics, Social values, Sewerage, Waste water treatment, Zoning, Costs, Tourism.
Identifiers: *Door County(Wis.), Economic development.

Trade-offs between economic development, groundwater quality, and growing tourism is explored for a portion of Door County, Wisconsin. A land use suitability study of the region was conducted. While the area provides diversified terrain, vegetation, and soil types, only about 8% of the total study area can support conventionally installed septic tanks while 23% utilize modified home systems. Soil evidence suggests that the corridor should be closely regulated to prevent future groundwater degradation. The effectiveness of Wisconsin public health controls and local organizations and institutions designed to control waste disposal systems is evaluated. Lack of staff, varying test procedures, and lack of waste disposal alternatives are among problems cited. The applicability of land use control devices including zoning, differential taxation, and easements to preserve water quality is assessed. The environmental impact resulting from continued development in the county are identified and the impact of declining water quality on tourism is evaluated; tourist surveys indicate potential losses if water quality continues to decline. Finally, the potential for public sewage and water systems in Door County is described including construction difficulties, funding sources, and possible costs. (Schroeder-Wisconsin)
W74-09565

CHEMICAL DESCRIPTIONS OF THE OCEANS,
Scripps Institution of Oceanography, La Jolla, Calif.
E. D. Goldberg.
Technology Review, Vol 72, No 8, p 25-29, June 1970, 4 fig.

Descriptors: *Sea water, *Water pollution, *Oceans, Marine biology, Aquatic life, Aquatic plants, Radioactive waste disposal, Mercury, Lead, DDT, Foods.
Identifiers: Marine chemistry.

A general essay is presented on the chemical makeup of the oceans and what has been and is being done to use these resources wisely and deal effectively with misuse and contamination. Sodium chloride has been extracted from the oceans for centuries, but recently other elements such as magnesium and bromine are being commercially removed from sea water, and in the very near future, one of the most important constituents of sea water worthy of mining may be the water itself. Living organisms of the sea constitute a valuable food source to man, because the primary production of organic matter by the photosynthesizing plants of the sea yields a food base for the higher organisms. The nuclear era has significantly widened knowledge of the composition of sea water. There is no evidence that radioactive pollutants from nuclear power plants have had any widespread adverse effects on marine communities, and these additions of radioactivity provide convenient tags on the movements of waters and sediments. The main danger facing oceans today is the inputs by man, such as lead, mercury, pesticides and oil, which have equaled or exceeded inputs by rivers. Monitoring pollution now forms a most significant area of investigation in marine chemistry. (Jernigan-Vanderbilt)
W74-09570

MERCURY AND OTHER METALS IN BRITISH SEALS,
Institute for Marine Environmental Research, Lowestoft (England). Fisheries Lab.
P. B. Heppleston, and M. C. French.
Nature, Vol 243, No 5402, p 302-304, June 1973. 2 fig, 4 tab, 11 ref.

Descriptors: *Marine animals, *Mammals, *Mercury, Heavy metals, Lead, Cadmium, Analytical techniques, Testing procedures, Spectroscopy, Laboratory tests, Distribution, *Metals.
Identifiers: *Seals, *United Kingdom.

Soft-tissue samples taken from ninety-six seals, both common seals and grey seals, from six sites around Britain between February 1968 and January 1972 were analyzed for mercury and other heavy metals. The following conclusions are suggested: mercury reaches a ceiling level in brains at about 12-18 months; residues in man reach similar levels and also show no correlation with age. Mercury tends to accumulate in the liver, with age, reaching fairly high levels. Cadmium accumulates in the kidney, as it does in man, where it is known to occur in higher concentrations than in other organs. There do not seem to be regional differences in metal concentrations in the teeth, but some metals were found in greater quantities in younger seals than in old ones, probably related to the pattern of tooth growth. Regional differences in the amounts of mercury in the tissues do not seem to be related to possible agricultural or industrial pollution. The importance of taking age into account when studying the amounts of metals in biological tissues is stressed. (Jernigan-Vanderbilt)
W74-09571

A SURVEY OF TRACE METALS IN HUMAN HAIR,
Lamar Univ., Beaumont, Tex. Dept. of Chemistry.
E. A. Eads, and C. E. Lambdin.
Environmental Research, Vol 6, p 247-252, 1973. 5 tab, 9 ref.

Descriptors: *Lead, *Mercury, *Cadmium, *Zinc, *Industrial wastes, Spectrophotometry, Toxicity, Public health, Laboratory tests, Distribution, *Texas, Trace elements.
Identifiers: Atomic absorption spectroscopy, *Human hair, Port Arthur(Tex).

Metals of recent concern: Pb, Hg, Cd, Ni, Mn, Zn, and Cu (products of industrial pollution and auto exhaust emissions which enter the body through various means) were determined in selected hair samples from subjects from the petroleum and petrochemical complex of Port Arthur, Texas. Men's samples representing ages 9-60 yrs and emale samples representing ages 13-72 yrs were taken. They were soaked and rinsed in de-ionized water and in methanol to remove impurities, after which atomic absorption spectrophotometry was used to determine trace metal content. The data from the environmental studies offered a correlation of metals concentration as a function of hair color and age. Zinc and copper appear to be more related to natural hair pigmentation than the environmental levels. In both male and female samples Cd, Ni, Mn, and Cu were fairly uniformly distributed while extensive variations were observed for Pb, Hg, and Zn. The concentration of lead in the hair of males seemed to increase with the age, but no other trends were apparent in the male subjects. Reasonably close agreement between determined and published values was noted for all metals except lead. This is attributed to the higher airborne lead content in a gasoline production center. (Jernigan-Vanderbilt)
W74-09573

MERCURY IN TUNAS: A REVIEW,
Inter-American Tropical Tuna Commission, La Jolla, Calif.
C. L. Peterson, W. L. Klawe, and G. D. Sharp.
Fishery Bulletin, Vol 71, No 3, p 603-613, 1973. 1 fig, 2 tab, 35 ref.

Descriptors: *Mercury, *Fish, *Toxicity, Public health, Contaminants, Organic compounds, Inorganic compounds, Distribution, Standards, *Reviews.
Identifiers: Concentration, *Tuna.

Mercury in the aquatic environment comes from both natural processes and industrial activities. The latter probably have not significantly altered the mercury content of the high seas where most tunas are captured. Mercury compounds enter aquatic organisms through the food web and/or by direct extraction from solution. The relative importance of these pathways in tunas is unknown. Mercury occurs in tuna principally in the form of methylmercury. Generally, tunas appear to have higher mercury levels than those fish species which occupy a lower level in the food chain. Mercury content of tunas varies according to fish size. However, other factors such as area of capture, differential growth rates, varying analytical techniques, and different sampling methods may account for some of the observed variation. The U.S. Food and Drug Administration has established an 'in-house' standard of 0.5 ppm of mercury for fishery products sold in the United States. Other countries have established limits as high as 1.0 ppm. (Jernigan-Vanderbilt)
W74-09574

EXCRETION AND ABSORPTION OF METHYL MERCURY AFTER POLYTHIOL RESIN TREATMENT,
Rochester Univ. Medical Center, N.Y. Dept. of Radiation Biology and Biophysics.
For primary bibliographic entry see Field 5C.
W74-09575

CADMIUM: MODE OF OCCURRENCE IN ILLINOIS COALS,
Geological Survey, Urbana, Ill.
H. J. Gluskoter, and P. C. Lindahl.
Science, Vol 181, p 264-266, July 1973. 1 fig, 1 tab, 13 ref.

Descriptors: *Cadmium, *Coals, *Zinc, Analytical techniques, Laboratory tests, Testing procedures, Spectroscopy, Distribution, *Illinois, Trace elements.
Identifiers: Sphalerites.

In an investigation of the potentially volatile trace elements in coals relatively high Cd and Zn concentrations were found in several Illinois coals. All coal samples analyzed were either face channel or drill core samples and were representative of the entire coal seam, with the exception of mineral bands over 0.95 cm thick. The coals were ashed and then analyzed by atomic absorption spectrophotometry. The cadmium content of 23 Illinois coals ranges from less than 0.3 to 28 parts per million. The higher cadmium contents are found in coals that also have a relatively high zinc content (18 to 3100 ppm). Cadmium occurs in these coals in solid solution, replacing zinc in the mineral sphalerite (ZnS). The ratios of zinc to cadmium in sphalerites are similar to the ratios of zinc to cadmium in the whole coals from which the sphalerites were separated. (Jernigan-Vanderbilt)
W74-09578

HEAVY METAL ESTIMATION IN BIOLOGICAL SYSTEMS,
Bristol Univ. (England). School of Chemistry.
G. Nickless.
Chemistry and Industry, p 715-718, August 1973. 1 fig, 2 tab, 25 ref.

Descriptors: *Trace elements, *Toxins, *Organic matter, *Analytical techniques, Mercury, Mass spectrometry, Cadmium, Instrumentation, Colorimetry, Spectroscopy, Regulation, Monitoring.
Identifiers: Sample preparation.

Problems in determination of trace elements in water, air and biological systems include lack of standard procedures, necessity for different methods for different samples and the presence of trace amounts of heavy metals as essential to biological systems. Decomposition of the sample in preparation for analysis must be preceded by a consideration of the type material analyzed, the elements and forms analyzed for, precision and occuracy required, sample size, time allowed, cost and difficulty of analysis. Pros and cons of dry and wet decomposition, application of biological standards (orchard leaves or beef liver), and the three main groups of instrumental methods (electroanalysis, optical methods, and mass spectrometry and neutron activation analysis) are discussed briefly. Examples of the concentration power of organisms are given. Long-term sublethal hazards to heavy metals are just beginning to be noticed. A decision must be made whether to accept them as a hazard of the 20th century or to implement control at the source through tougher legislation. (Jernigan-Vanderbilt)
W74-09580

APPLICATION OF ERTS-1 IMAGERY IN THE VERMONT-NEW YORK DISPUTE OVER POLLUTION OF LAKE CHAMPLAIN,
Vermont Univ., Burlington. Remote Sensing Lab.
A. O. Lind.
Available from NTIS, Springfield, Va. 22151 as N74-11183, Price $3.00 printed copy; $1.45 microfiche. National Aeronautics and Space Administration Contract Report CR-135962, October 1973. 5 p, 1 fig, 3 ref. NASA Contract NAS 5-21753.

Descriptors: *Remote sensing, *Path of pollutants, *Lakes, *New York, *Vermont, Pulp wastes, Pulp and paper industry, Water pollution, Mapping, Legal aspects.
Identifiers: *Lake Champlain.

Three ERTS-1 images from different dates were used to document the effluent pattern in Lake Champlain emanating from the large papaer mill north of Fort Ticonderoga, N.Y. A composite map shows the plume. The State of Vermont is currently suing both the International Paper Company and the State of New York for degrading the waters of Lake Champlain in Vermont. Vermont proposed that the map and the enlarged reproductions of ERTS imagery be entered in evidence. The special U.S. Supreme Court Master accepted the ERTS imagery and the ERTS-derived information in evidence. This is the first time that satellite imagery and satellite-derived information have been used as evidence in a court of law. (Knapp-USGS)
W74-09585

AN OCEANOGRAPHIC OBSERVATION OF NEW YORK BIGHT FROM ERTS-1,
Atlantic Oceanographic and Meteorological Lab., Miami, Fla. Physical Oceanography Lab.
R. L. Charnell, and G. A. Maul.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. National Oceanic and Atmospheric Administration Technical Report ERL 262-AOML 9, February 1973. 8 p, 2 fig, 1 ref.

Descriptors: *Remote sensing, *Bays, *Path of pollutants, Water quality, Coasts, New York, Satellites(Artificial), Industrial wastes, Acids, Turbidity, Data collections.
Identifiers: *New York Bight, *ERTS.

The Earth Resources Technology Satellite (ERTS-1), made a transit over New York Bight on August 16, 1972. Imagery from this transit shows several oceanographic features that demonstrate the usefulness of remote sensing over a large area for the synoptic observation of changes in water quality in the coastal zone. Both the extent and turbulent character of the Hudson River plume are discernible. Residue from a dump of waste acid is visible over a 5-mile area in the apex of the bight. Little dispersion of this residue has occurred. This feature will be a persistent signature in images from future satellite transits. (Knapp-USGS)
W74-09589

GROUNDWATER POLLUTION.
Available from Underwater Research Institute Publications, 4331 Humphrey, St. Louis, Mo. 63116, $5.00. Underwater Research Institute, St. Louis, Missouri, 1973. 198 p.

Descriptors: *Water pollution sources, *Groundwater, *Conferences, Path of pollutants, New England, Lakes, Septic tanks, Coal mines, Acid mine water, Saline water intrusion, Farm wastes, New Mexico, Data processing, Legal aspects, Urbanization.

Groundwater pollution was discussed in a conference held at St. Louis in 1973. The subjects include the effects of artificial lakes on groundwater, coal mine pollution, septic tanks, saline water invasion of aquifiers, pollution by agriculture, pollution of the Ogallala aquifer, data processing, legal aspects, pollutant transport, and the environmental effects of urbanization in New England. (See W74-09591 thru W74-09598) (Knapp-USGS)
W74-09590

THE EFFECT OF AN ARTIFICIAL LAKE DEVELOPMENT COMPLEX ON THE GROUNDWATER SYSTEM,
Wisconsin State Univ., Oshkosh. Dept. of Geology.
J. I. Hoffm ..., and N. Meland.

In: Groundwater Pollution; Proceedings of Groundwater Pollution Conference, October 1971, St. Louis, Missouri: Underwater Research Institute, St. Louis, p 1-12, 1973. 6 fig, 2 tab, 4 ref.

Descriptors: *Water pollution sources, *Groundwater, *Lakes, *Artificial lakes, Land use, Surface-groundwater relationships, Urbanization, Water pollution control, *Wisconsin.
Identifiers: *Legend Lake(Wisc).

Lakes exceeding 1,000 acres are being created in response to a demand for recreational lake property. Legend Lake, a newly created 1,270-acre artificial lake near Keshena, Wisconsin, offered a unique chance to try to evaluate environmental, economic, and social aspects of man's influence on a lake and its surrounding area. A long-range program of monitoring water quality, shoreline erosion, plant growth, and changes in the groundwater system was begun in 1969, along with attempts to evaluate social and economic impact. Construction of Legend Lake caused an increase in the height of the groundwater table, which resulted in a tree kill. Groundwater flow was reversed in some areas, and those regions influenced by reversed flow will probably experience some increase in water hardness. The use of septic tanks near the shorelines of developed lakes appears to have stimulated eutrophication of many of these lakes. Tertiary sewage treatment or nutrient removal systems would better insure that groundwater and surface waters would remain free of pollution. (See also W74-09590) (Knapp-USGS)
W74-09591

COAL MINING AND ITS EFFECT ON WATER QUALITY,
Ohio Univ., Athens. Dept. of Geology.
M. U. Ahmad.
In: Groundwater Pollution; Proceedings of Groundwater Pollution Conference, October 1971, St. Louis, Missouri: Underwater Research Institute, St. Louis, p 13-52, 1973.

Descriptors: *Water pollution sources, *Acid mine water, *Coal mines, Coal mine wastes, Strip mines, Ohio, Mine acids, Strip mine wastes, Hydrogeology, Path of pollutants.

Coal mining has seriously degraded the water quality of streams in Appalachia and other parts of the United States, and in some cases has also damaged underground aquifers. In general quality of the water draining from coal mines is dependent upon the thickness of the shale lying directly over the coal being mined. Water from mines that have a thin layer over the coal is often non-acid or only mildly acid, while the mines that have thick shale over the coal have drainage that is slight to very acid. The Sheban Mine (79 acres) is a typical coal mine and is described in detail to illustrate a typical problem of acid discharge. The mine is located in the N.E. Quarter of Goshen Township, Mahoning County, Ohio. Since water is the transport media for carrying acid and salts from the mine environment, reducing the amount of water passing through an underground mine will reduce the amount of pollution. Mine sealing reduces the production of acid by excluding air from pyrite materials to prevent their oxidation. This has proved to be relatively ineffective. (See also W74-09590) (Knapp-USGS)
W74-09592

SEPTIC TANKS AND GROUNDWATER POLLUTION,
Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
R. A. Minear, and J. W. Patterson.
In: Groundwater Pollution; Proceedings of Groundwater Pollution Conference, October 1971, St. Louis, Missouri: Underwater Research Institute, St. Louis, p 53-71, 1973. 4 fig, 4 tab, 51 ref.

Descriptors: *Water pollution sources, *Groundwater, *Septic tanks, Soil disposal fields, Path of pollutants, Bacteria, Viruses, Organic matter, Domestic wastes.

About 13 million private septic tanks are in use in the United States today, with an additional half million being installed each year. This wide use of septic systems has persisted in the face of a consistent history of septic tank failure and the almost unanimous disapproval by public health engineers of their use in any except the most isolated households. Estimates of the number of septic tanks performing inadequately range up to 50% of those in use today. These malfunctional systems constitute a severe public health hazard and a major source of contamination of the environment. The most critical environmental effect of septic systems is contamination of groundwater and private well supplies. The soil is the primary treatment process of the septic system, and if the soil becomes clogged and overloaded with sewage, the system will quickly fail, with attendent health hazard, sanitary nuisance, and environmental pollution. (See also W74-09590) (Knapp-USGS)
W74-09593

POLLUTION OF GROUNDWATER BY SALT INVASION,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
A.-A. I. Kashef.
In: Groundwater Pollution; Proceedings of Groundwater Pollution Conference, October 1971, St. Louis, Missouri: Underwater Research Institute, St. Louis, p 72-89, 1973. 12 fig.

Descriptors: *Saline water intrusion, *Groundwater, Aquifers, Hydrogeology, Withdrawal, Path of pollutants, Groundwater movement, Water pollution control, Artificial recharge, Groundwater barriers, Saline water barriers, Saline water-freshwater interfaces.

Coastal aquifers that have their boundaries in contact with saltwater bodies are invaded by saltwater. The extent depends upon climatic conditions, the characteristics of the natural flow within these aquifers, and the manner of groundwater usage. The invaded zones increase in size with overdraft of groundwater. The main known remedial measures are limiting water usage, artificial recharge, hydraulic barriers, pumping troughs, cutoff walls (or underground dams), and direct saltwater removal. (See also W74-09590) (Knapp-USGS)
W74-09594

GROUNDWATER POLLUTION BY AGRICULTURE,
Louisiana Tech. Univ., Ruston. Dept. of Agricultural Engineering.
J. W. D. Robbins, and G. J. Kriz.
In: Groundwater Pollution; Proceedings of Groundwater Pollution Conference, October 1971, St. Louis, Missouri: Underwater Research Institute, St. Louis, p 91-114, 1973. 2 tab, 97 ref.

Descriptors: *Water pollution sources, *Groundwater, *Farm wastes, Fertilizers, Return flow, Pesticides, Water pollution control, Soil water.

Agricultural enterprises produce wastes that may lead to rapid degradation of groundwater. Since most agricultural wastes are released at or slightly below the ground surface, water-table aquifers are especially vulnerable to contamination. Five major categories of agricultural groundwater pollutants are animal wastes, fertilizers, pesticides, plant residues, and saline irrigation-waste waters. Suggested approaches to solution of the problem include: detailed studies of a few representative sites, synthesis of results of research applicable to the problems, analyses of specific sites before commitments to water and waste projects have been made, evaluation of specific sites after contamination has occurred; and background studies for gaining an understanding to utilize the technology to control the undesirable degradation of groundwater. (See also W74-09590) (Knapp-USGS)
W74-09595

POLLUTION STUDIES OF THE REGIONAL OGALLALA AQUIFER AT PORTALES, NEW MEXICO,
Eastern New Mexico Univ., Portales. Dept. of Biological Sciences.
P. D. Bigbee, and R. G. Taylor.
In: Groundwater Pollution; Proceedings of Groundwater Pollution Conference, October 1971, St. Louis, Missouri: Underwater Research Institute, St. Louis, p 115-131, 1973. 6 fig, 17 ref.

Descriptors: *Water pollution sources, *Aquifers, *Groundwater, *New Mexico, Fertilizers, Septic tanks, Farm wastes, Water quality, Nitrates, Coliforms, Path of pollutants.
Identifiers: *Portales(NM).

The Ogallala Aquifer is polluted at Portales, N.M. The bacterial contamination of the aquifer is caused by cesspool and septic tank pollution and feedlot runoff. The nitrate concentrations in almost all wells sampled are above 10 ppm, and six of the wells are above 45 ppm. A large number of the irrigated fields in the Portales area are fertilized with ammonia which can be oxidized by the soil bacteria to form nitrates. Nitrates are water soluble and are not complexed by soil; therefore, they are easily leached from the soil and transported by water. The summer months are the time of year in Portales when irrigation is at its maximum, and a large amount of water is pumped onto the fields. (See also W74-09590) (Knapp-USGS)
W74-09596

POLLUTANT TRANSPORT AND ACCUMULATION PROCESSES IN OUR ENVIRONMENT--THE GENERAL THEORY AND A CASE STUDY OF MERCURY FROM THE FOUR CORNERS ELECTRIC POWER PLANTS AND IN NAVAJO LAKE, NEW MEXICO,
National Aeronautics and Space Administration, Albuquerque, N. Mex.
C. L. Hyder.
In: Groundwater Pollution; Proceedings of Groundwater Pollution Conference, October 1971, St. Louis, Missouri: Underwater Research Institute, St. Louis, p 159-173, 1973. 11 ref.

Descriptors: *Mercury, *Air pollution, *Water pollution sources, *Thermal powerplants, Coals, *New Mexico, Trace elements, Poisons, Lakes, Surface waters, Path of pollutants, Groundwater.
Identifiers: *Navajo Lake(N.M.).

Powerplant generation of pollutants, atmospheric transport processes, and topographical and biological concentration processes were studied theoretically. The results are applied to the coal-burning electric powerplants near Four Corners, New Mexico. The total amount of mercury produced by the powerplants and transported into a nearby lake (Navajo Lake, New Mexico) was predicted and compared with the total amount of mercury measured in Navajo Lake. The near-equilibrium concentrations of mercury in Navajo Lake were also compared with the predictions. The Four Corners electric powerplants are probably significant contributors to the mercury measured in fish taken from Navajo Lake. The same may be true of the San Juan arm of Lake Powell, Utah. (See also W74-09590) (Knapp-USGS)
W74-09597

SOME POTENTIAL ENVIRONMENTAL PROBLEMS FROM POPULATION EXPLOSION AND URBAN DEVELOPMENT IN MAS-

SACHUSETTS AND ADJACENT PARTS OF NEW ENGLAND,
Massachusetts Univ., Amherst. Dept. of Geology.
W. S. Motts.
In: Groundwater Pollution; Proceedings of Groundwater Pollution Conference, October 1971, St. Louis, Missouri: Underwater Research Institute, St. Louis, p 174-198, 1973. 8 fig, 2 tab, 23 ref.

Descriptors: *Water pollution sources, *Groundwater, *New England, Chlorides, Landfills, Garbage dumps, Salts, Deicers, Urbanization, Path of pollutants, Snow removal, *Massachusetts.

Some potential groundwater and environmental problems in Massachusetts and adjacent parts of New England may develop as an indirect result of an increase of population accompanied by increased housing and urban development, a proliferation of roads and highways, more landfills, and more industries. The nature and magnitude of these environmental problems are influenced to a large extent by the characteristic geology, soil types, vegetation, groundwater occurrence, and climate of the New England Topographic Province. The increase of chlorides in groundwater supplies is the result of addition of salts to highways, increases in general pollution due to additional domestic septic tank usage, increases of town dumps, the drought from 1960 through 1967, and effects of air pollution which increases the chloride content in precipitation. (See also W74-09590) (Knapp-USGS)
W74-09598

AN INTERDISCIPLINARY STUDY OF THE ESTUARINE AND COASTAL OCEANOGRAPHY OF BLOCK ISLAND SOUND AND ADJACENT NEW YORK COASTAL WATERS,
Long Island Univ., Greenvale, N.Y. Science Engineering Research Group.
E. F. Yost.
Available from NTIS, Springfield, Va. 22151 as E73-10819 - Price $3.00 printed copy; $1.45 microfiche. Interim Report to NASA Goddard Space Flight Center, June 1973. 3 fig, 1 tab.

Descriptors: *Remote sensing, *Water quality, *Estuaries, Satellites(Artificial), Turbidity, Sewage disposal, Path of pollutants, *New York.
Identifiers: *Block Island Sound(NY), ERTS.

ERTS-1 imagery of New York coastal waters was photographically enhanced to emphasize apparent water color differences. Water samples were collected simultaneously with the acquisition of satellite data. Water turbidity, particularly that arising from sewage dump areas, and sediment discharge from coastal inlets correlate well with the ERTS-1 color signatures. (Knapp-USGS)
W74-09602

CLOUD SEEDING FOR SNOW AUGMENTATION: LAND USE RAMIFICATIONS OF RESIDUAL SILVER IODIDE NUCLEATING AGENTS,
Colorado State Univ., Fort Collins. Dept. of Microbiology.
D. A. Klein, and R. A. Sokol.
Proceedings for sale by Western Snow Conference, R. T. Davis, Secretary, Rm. 360, U.S. Courthouse, Spokane, Wash. 99201 - Price $3.00.
In: Proceedings of the 41st Annual Meeting of the Western Snow Conference, April 17-19, 1973, Grand Junction, Colorado: Colorado State University, Fort Collins, p 30-36, 1973. 3 fig, 7 ref.

Descriptors: *Path of pollutants, *Cloud seeding, *Silver iodide, *Soil microbiology, Soil microorganisms, Soil environment.

In seeding winter storms in the Western USA, a possible concern in land use planning involves the potential effects residual silver iodide nucleating agents may have on soil microbial processes. If a seeding rate of 0.02 gram of silver/ha/cm of precipitation is used, then 60 cm of seeded precipitation could deliver 1.2 grams of silver as silver iodide/ha/year, or 0.12 mg of silver per surface square meter. Effects of varied silver forms on soil microbial respiration processes were carried out by use of a simplified respirameter using undisturbed surface soil cores of 6.5 cm diameter and 8.0 cm depth obtained in the Fort Collins area. Silver in the forms of silver iodide and silver nitrate were added to soils as acetone and water solutions respectively, and respiration indices were carried out over 10-day periods at 25 deg C in the dark. Silver iodide added to soils directly as a fine powder did not have discernible effects on soil respiration processes when carried out over short-term experiments. Up to 1.0 gram of silver iodide added to 100 grams of soil was not able to cause discernible decreases in all-over microbial respiration rates. Addition of silver in the form of silver nitrate, a freely-soluble silver form, was capable of causing discernible decreases in soil respiration rates when added at 1.0 ppm, and essentially complete cessation of microbial respirations occurred when 100 ppm were used, indicating that the form of silver added to a natural environment is more important than the total amount added. (Knapp-USGS)
W74-09606

CHANGES IN OXYGEN AND PRIMARY PRODUCTION OF THE PATUXENT ESTUARY, MARYLAND, 1963 THROUGH 1969,
Geological Survey, Edgewater, Md.
R. L. Cory.
Chesapeake Science, Vol 15, No 2, p 78-83, June 1974. 4 fig, 1 tab, 16 ref.

Descriptors: *Dissolved oxygen, *Primary productivity, *Eutrophication, *Estuaries, *Maryland, Respiration, Water temperature, Water pollution effects.
Identifiers: *Patuxent Estuary(Md).

Water quality was monitored from 1963 through 1969 in the upper-middle Patuxent estuary, near Benedict, Maryland. Over the period of record, a pronounced change occured in the diel oxygen measurement, particularly during the months of July, August, and September. Annual variations of dissolved oxygen ranged from 3.6 to 15.0 mg per liter in 1964 and from 2.3 to 16.5 mg per liter in 1969 with percentage saturation varying from 60% to 130% in 1964 and from 30% to 184% in 1969. The magnitude of diel summer oxygen variation changed from about 3 to 7 mg per liter per day over the same period. From hourly values of temperature, oxygen, and conductivity, gross primary production (GP) and respiration (R) were estimated. From the seasonal data, GP ranged from about 3 to 25 g of oxygen per sq m per day, and R ranged from about 4 to 32 g of oxygen per sq m per day. On average days, GP ranged from 2 to 10 g of oxygen per sq m per day in 1964 and from 1 to 16 in 1969. In 1964, daily average GP was 5.2 grams of oxygen per sq m per day as compared to 6.1 in 1969, and respiration was 6.1 grams of oxygen per sq m per day in 1964 versus 10.2 grams of oxygen per sq m per day in 1969, increases of 20% and 16%, respectively. Ratios of GP/R averaged 0.84 in 1964 versus 0.60 in 1969, reflecting a larger respiration in 1969 and suggesting a trend towards community instability. The increases in production were attributed to upstream domestic waste loading. If the present trend increases, metabolic imbalance and anaerobic conditions may develop. (Knapp-USGS)
W74-09624

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SURFACE MINE SPOIL TREATED WITH FLY ASH,
Northeastern Forest Experiment Station, Princeton, W.Va.
W. T. Plass, and J. P. Capp.
Journal of Soil and Water Conservation, Vol 29, No 3, p 119-121, May-June 1974. 3 fig, 3 tab, 4 ref.

Descriptors: *Mine wastes, *Fly ash, *Waste dumps, *Land reclamation, *Strip mines, Water pollution control, Nutrients, Soil moisture, Infiltration, Vegetation.

Use of powerplant fly ash for surface mine reclamation offers an attractive outlet for large tonnages of this waste material. Research by the U.S. Bureau of Mines beginning in 1963 showed that fly ash could be used to neutralize extremely acid surface mine spoil. The agency's treatments favored establishment of grass and legume cover by modifying chemical and physical characteristics of the spoil. Changes that occurred in a spoil following the application of 150 tons of fly ash per acre are described. The treatment neutralized acidity, added plant-available phosphorus, lowered spoil density, and increased subsurface moisture. (Knapp-USGS)
W74-09631

ANTIMONY IN GROUNDWATER OF THE KADAMDZHAY DEPOSIT (SUR'MA V PODZEMNYKH VODAKH KADAMDZHAYSKOGO MESTOROZHDENIYA),
Tomsk Polytechnic Inst. (USSR).
For primary bibliographic entry see Field 4B.
W74-09648

CHEMICAL STUDIES OF SOLIDS, RUNOFF, SOIL PROFILE AND GROUNDWATER FROM BEEF CATTLE FEEDLOTS AT MEAD, NEBRASKA,
T. M. McCalla, J. R. Ellis, C. B. Gilberston, and W. R. Woods.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 211-223 (1972). 5 fig, 5 tab, 5 ref.

Descriptors: *Feed lots, *Agricultural runoff, *Soil profiles, Slopes, *Continuous flow, Chemical properties, Groundwater, Nitrogen, Phosphorus, Solid wastes, *Cattle, *Nebraska, *Farm wastes.
Identifiers: Batch system, Settleable solids, Cattle density, Electrical conductivity, Mead(Neb.).

A 4-year study at Mead, Nebraska, was made to determine the effects of cattle density and slope on possible pollution of surface water, soil profile, and groundwater from beef cattle feedlots. The batch system and the continuous flow system were used for removal of settleable solids from runoff. Chemical analyses were made of the wastes and runoff produced by these two systems. Conclusions were: (1) Feedlot runoff transports excess nutrients and must not be discharged into streams. (2) The quantity of volatile solids and nitrogen and phosphorus removal rates from the feedlot surface were proportional to stocking rate during mechanical cleaning. (3) An increase in the slope of the feedlot increased the quantity of total solids, volatile solids, nitrogen, and phosphorus removed from the feedlot. (4) The runoff data on these lots indicate that the variability is too great to determine the effect of feedlot slope on runoff quantity and quality. (5) Beef cattle feedlots with heavy, constant stocking on loess hills do not create a groundwater problem, but nitrate buildup was found in profiles of adjacent areas. (6) The soil texture of the retention structure and the procedure and materials used to seal the structure are necessary considerations in preventing nitrate accumulations in the soil profile and groundwater. (See also W74-09663) (Marquard-East Central)
W74-09680

BEEF BARNLOT RUNOFF AND STREAM WATER QUALITY,
Ohio Agricultural Research and Development Center, Worster.
R. K. White, and W. M. Edwards.

In: Waste Management Research Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 225-235 (1972). 6 fig, 1 tab, 6 ref. OWRR A-023-OHIO(2).

Descriptors: *Biochemical oxygen demand, *Chemical oxygen demand, *Water quality, *Cattle, *Ohio, *Farm wastes, Water quality standards, Solid wastes, Waste water treatment.
Identifiers: *Barnlot runoff, Volatile solids, Total solids, Clarksburg silt loam.

Objectives were to determine the concentration and amounts of solids and organic material in the runoff from a barnlot and to identify the effect of rainfall and runoff patterns and seasonal conditions on barnlot runoff quality. Runoff for a 16-month period from a 60 head beef cattle barnlot located on silt loam was sampled and analyzed for total solids (TS), volatile solids (VS), biochemical oxygen demand (BOD), and chemical oxygen demand (COD). Runoff usually occurs when rainfall exceeds .5 inches. Transport of TS is related to the volume of runoff. BOD concentration and transport are larger in winter and smaller in summer except for the periods following dry antecedent conditions. Concentrations of TS, BOD, and COD are variable within a runoff event. Average yearly runoff, based upon 3 year records, is presented. A yearly BOD concentration curve for runoff is projected. An estimate of yearly transport of BOD can be projected from these two relations. (See also W74-09663) (Marquard-East Central)
W74-09681

INITIAL OBSERVATIONS OF SEVERAL MEDIUM SIZED BARRIERED LANDSCAPE WATER RENOVATION SYSTEMS FOR ANIMAL WASTES,
Michigan State Univ., East Lansing.
For primary bibliographic entry see Field 5D.
W74-09695

CONTRIBUTION OF ANIMAL WASTE TO NITRATE NITROGEN IN SOIL,
Pennsylvania State Univ., University Park.
J. F. Marriott, and H. D. Bartlett.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 435-440, (1972). 1 fig, 2 tab, 1 ref.

Descriptors: *Farm wastes, *Waste disposal, *Nitrogen, Soils, Rates of application, *Slurries, Water pollution, Groundwater, Dairy industry, Odor, *Waste water treatment, Path of pollutants.
Identifiers: Hagerstown silt loam, Suction lysimeters, *Nitrate nitrogen.

Research was done to determine the movement and accumulation of nitrate nitrogen in soil after dairy manure slurry was applied below the surface of grass sod. Odor control was also to be determined. A liquid spreader spread slurry of 12.5% solids and 2.35% total N (dry matter basis) four inches below surface at treatment rates of 0, 15, 30, 45, 60, and 75 tons of moisture. Suction lysimeters were installed in each plot at depths of 1, 2, 3, and 4 feet for the purpose of sampling soil water. Samples were taken at 14 day intervals in 1970 and at monthly intervals in 1971. Soil samples were also taken. Both types of samples were analyzed for nitrate, ammonium nitrogen, chloride, and sodium. Even the lowest application rate of 15 tons per acre indicated enough nitrate excess to be a potential pollution hazard. Disposal of wastes in this manner practically eliminated odors. (See also W74-09663) (Marquard-East Central)
W74-09697

GRASS RESPONSE TO APPLICATIONS OF BEEF-CATTLE FEEDLOT RUNOFF,
For primary bibliographic entry see Field 5D.
W74-09700

SURFACE RUNOFF NUTRIENT LOSSES FROM VARIOUS LAND DISPOSAL SYSTEMS FOR DAIRY MANURE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
P. J. Zwerman, S. D. Klausner, D. R. Bouldin, and D. Ellis.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 495-502, (1972). 3 tab, 12 ref. EPA 13030 DPB.

Descriptors: *Agricultural runoff, *Waste disposal, *Farm wastes, *Nitrogen, *Phosphorus, Nitrates, Dairy industry, Crop rotations, Corn(Field), Alfalfa, Oats, Wheat, Organic matter, Rainfall simulators.
Identifiers: Nutrient losses, Soil loss, Orthophosphates.

Sixty randomly selected plot locations were subject to surface runoff tests with a rainfall simulator. Storm frequencies corresponding to 2, 10, and 20 years were applied in sequence to each plot. Soil condition results represent the effects of fourteen years of past management on seed beds prepared for corn. Heavy mineral fertilization increased runoff by 50%. Lack of a 6 ton manure application increased runoff 100%. Orthophosphate was increased by increased phosphate fertilizer. Runoff, nitrate, and orthophosphate increased with rain application. Increased mineral fertilization doubled the losses of soil, organic matter, total nitrogen, and total phosphorus. Six ton manure applications cut these losses in half. All losses increased with increased water applications. A two-by-four factorial analysis study again involved six tons of manure plowed down versus no manure on four crop rotations. All were at moderate rates of mineral fertilization. The rotations were: (1) continuous corn; (2) corn-corn-oats-alfalfa-alfalfa; (3) corn-oats-alfalfa-alfalfa; and (4) wheat-alfalfa-alfalfa-alfalfa-alfalfa. Manure effect in these rotations was non-significant. In (1) and (4), manure decreased or did not effect runoff, soil, and nutrient losses. In (2), manure significantly increased organic matter and total nitrogen loss. It increased runoff, nitrates, soil loss, and total phosphorus. In (3), manure significantly increased total phosphorus. It decreased nitrate. It increased soil loss, organic matter, and total nitrogen. (See also W74-09663) (Marquard-East Central)
W74-09702

55FE CONCENTRATION AND SPECIFIC ACTIVITIES IN NORTH PACIFIC MARINE ORGANISMS,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 5C.
W74-09733

WATER POLLUTION PREVENTION IN SOUTH WALES,
Wales Directorate of Engineering (England).
For primary bibliographic entry see Field 5G.
W74-09735

STUDIES OF THE SEASONAL VARIATION OF THE SUSPENDED MATTER OF THE MENAI STRAITS. II. MID STREAM DATA,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
S. Buchan, G. D. Floodgate, and D. J. Crisp.
Deutsche Hydrographische Zeitschrift, Vol 26, No 2, p 74-83, January, 1973. 9 fig, 2 tab, 3 ref.

Descriptors: *Correlation analysis, *Suspended load, Tidal streams, Water temperature, Wind tides, *Organic matter, Inorganic compounds, Bottom sediments, Turbidity, *Sediment load.
Identifiers: Surface sediments, *Menai Straits.

Surface and bottom inorganic and organic suspended loads in the Menai Straits were correlated with hydrographic and meteorologic elements which impart an influence on them. Surface inorganic loads correlated significantly with tidal range, water temperature, and run of wind. This latter factor did not relate well with the bottom inorganic fraction. Significant correlations were evident between surface and bottom organic loads and the tidal range. Turbidity and suspended sediment load were also investigated. (Sandoski-FIRL)
W74-09741

APPLICATION OF REAL-TIME MASS SPECTROMETRIC TECHNIQUES TO ENVIRONMENTAL ORGANIC GEOCHEMISTRY. II. ORGANIC MATTER IN SAN FRANCISCO BAY AREA WATER,
California Univ., Berkeley. Space Sciences Lab.
For primary bibliographic entry see Field 5A.
W74-09742

U.S. COAST GUARD OIL POLLUTION INVESTIGATION AND CONTROL SCHOOL.
Coast Guard, Yorktown, Va.
For primary bibliographic entry see Field 5G.
W74-09753

LEAD, CD, ZN, CU, AND CO IN STREAMS AND LAKE WATERS OF CAYUGA LAKE BASIN, NEW YORK.
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
J. Kubota, E. L. Mills, and R. T. Oglesby.
Environmental Science and Technology, Vol 8, No 3, p 243-248, March, 1974. 4 fig, 6 tab, 21 ref.

Descriptors: *Heavy metals, *Lead, *Cadmium, *Zinc, *Copper, *Cobalt, Lakes, *New York, Surface waters, Spatial distribution, Seasonal, Trace elements, Sediment transport, *Trace elements, Path of pollutants.
Identifiers: *Cayuga Lake basin(NY).

Waters of 12 tributary streams of Cayuga Lake were studied to determine the levels and seasonal and geographic patterns of trace elements in the Cayuga Lake basin, a primarily rural area. Trace elements in soluble form (filtered water) and in suspended particulates were studied. The trace element concentrations were generally low, but a seasonal pattern reflecting higher concentrations with high stream flow was noted in the case of Pb. Values for streams of rural areas reflect levels associated with normal geochemical processes and soil weathering. An impact of urbanization was reflected in higher levels of the trace elements in suspended particulates carried by these streams that flow through Ithaca, N.Y. A basis has been established to evaluate changes in trace elements load with future changes in land use and urbanization. (Jernigan-Vanderbilt)
W74-09762

MIGRATION AND REDISTRIBUTION OF ZINC AND CADMIUM IN MARINE ESTUARINE SYSTEM,
Geological Survey, Corpus Christi, Tex.
C. W. Holmes, E. A. Slade, and C. J. McLerran.
Environmental Science and Technology, Vol 8, No 3, p 255-257, March 1974. 10 fig, 2 tab, 11 ref.

Descriptors: *Zinc, *Cadmium, *Migration patterns, *Distribution patterns, Trace elements, Water analysis, *Path of pollutants, Coasts, Spatial distribution, *Texas, Sediments, Estuaries, Spectroscopy.
Identifiers: Atomic absorption spectroscopy, Coastal management, *Corpus Christi Bay(Tex).

The estuarine sediments of Texas in Corpus Christi Bay have anomalously high concentrations of zinc and cadmium. Data are presented on the distribution of these elements in the sediments, their seasonal variations, and the pathways by which they move within the estuarine system. 287 sediment and 156 water samples were taken and

analyzed for zinc and cadmium by atomic absorption spectrophotometry. Sediment zinc concentrations in the bay ranged from a maximum of 235 ppm near the entrance of the harbor to a minimum of 6 ppm, and cadmium concentrations ranged from a high of 1.9 ppm to a low of 0.1 ppm. In the harbor sediments, zinc ranged from a maximum of 11,000 ppm, approximately 8 km from the harbor entrance to a minimum of 235 ppm at the entrance. Cadmium ranged from 130 ppm to 2 ppm. Correlation of 0.80 between the zinc and cadmium concentrations in the bay and harbor sediments indicated an identical source. The zinc and cadmium concentrations in the bay are the result of transfer from harbor sediments, mainly in winter, even after the effluent from industrial processes is stopped. (Jernigan-Vanderbilt)
W74-09777

GASTROINTESTINAL ABSORPTION OF DIFFERENT COMPOUNDS OF 115M CADMIUM AND THE EFFECT OF DIFFERENT CONCENTRATIONS IN THE RAT,
National Environmental Research Center, Cincinnati, Ohio. Environmental Toxicology Research Div.
For primary bibliographic entry see Field 5C.
W74-09778

OCCURRENCE OF LI, B, CU, AND ZN IN SOME EGYPTIAN NILE SEDIMENTS,
Goettingen Univ. (West Germany). Sediment-Petrographisches Institut.
M. M. Ashry.
Geochimica et Cosmoshimica Acta, Vol 37, p 2449-2458, 1973. 8 fig, 2 tab, 22 ref.

Descriptors: River systems, *Boron, *Clays, *Sediments, *Copper, *Zinc, Testing procedures, Analytical techniques, *Water analysis, Heavy metals, Spectroscopy, Colorimetry, X-ray fluorescence, Trace elements.
Identifiers: *Nile River, Egyptian delta, *Lithium.

Lithium, boron, copper and zinc have been determined on cored and surface sediments from the delta and the drainage valley of the Nile River. The clay size fraction separated from the samples consists of montmorillonite and kaolinite as the predominant clay components, followed by illite and chlorite. Quartz and calcite are the non-clay admixtures. Lithium content varies between 7 and 48 ppm in the bulk sediments and between 28 and 61 ppm in the clay fractions, being clearly enriched in the clay material. In the clay fractions, concentration of lithium in kaolinite is indicated by a close relation between the lithium and kaolinite contents and is further supported by a close correlation with Al2O3. Boron in the clay fraction (62-112 ppm) appears to be concentrated in detrital illite. The concentrations of copper (26-900 ppm) and zinc (65-333 ppm) in the clay fractions correlate positively with the CO2 percentage. Both elements tend to occur in or on the clay-sized grains of calcite. (Jernigan-Vanderbilt)
W74-09779

CADMIUM, NICKEL, LEAD, AND ZINC IN EARTHWORMS FROM ROADSIDE SOIL,
Bureau of Sport Fisheries and Wildlife, Washington, D.C. Div. of Wildlife Refuges.
For primary bibliographic entry see Field 5C.
W74-09780

RELATION OF TRACE METALS TO HUMAN HEALTH,
Dartmouth Coll., Hanover, N.H. Dept. of Physiology.
For primary bibliographic entry see Field 5C.
W74-09790

PARTICULATE LEAD CONTAMINATION RECORDED IN SEDIMENTARY CORES FROM LAKE WASHINGTON, SEATTLE,
Washington Univ., Seattle. Dept. of Oceanography.
E. A. Crecelius, and D. Z. Piper.
Environmental Science and Technology, Vol 7, No 11, p 1053-1055, November 1973. 4 fig, 16 ref.

Descriptors: *Lead, Lakes, Sediments, Fir trees, *Path of pollutants, Water pollution sources, Spatial distribution, Temporal distribution, *Washington, *Lake sediments, Spectroscopy.
Identifiers: Atomic absorption spectroscopy, *Lake Washington(Wash).

The aim was to evaluate the present relative contribution of lead to the environment by autos and smelters and the relative change in the overall level of lead pollution from the time of the development of the Seattle area, approximately 1880, to the present. To estimate past levels of lead pollution in the area, two sedimentary gravity cores were taken from Lake Washington which forms the eastern boundary of Seattle. To identify present-day sources, the distribution of lead in the needles of Douglas fir trees in the vicinity of the Tacoma smelter (35 km SSW of the lake) and near and distant from major highways was determined. Both types of samples were measured by atomic absorption spectrometry. The lead concentration in the cores exhibits an increase from about 25 ppm at the 30-50 cm depth to about 400 ppm in near surface sediment; this represents a twenty-fold increase during the past 80 years. Much of this increase is probably due to lead additives in gasoline introduced during the 1920's. The highest lead values in the fir needle samples (100 ppm) were observed in those trees located near major highways. This distribution of lead supports the conclusion that automobiles represent the major source of lead pollution to the lake today. (Jernigan-Vanderbilt)
W74-09791

5C. Effects Of Pollution

BIOLOGICAL DEGRADATION OF HYDROCARBONS IN WATER,
Rhode Island Univ., Kingston. Dept. of Microbiology.
For primary bibliographic entry see Field 5B.
W74-09254

AUDUBON BLACK PAPER NUMBER 1, OIL POLLUTION,
M. Zeldin.
Audubon, Vol 73, No 3, p 99-119, May 1971.

Descriptors: *Water Quality Act, *Legislation, *Oil spills, *Oil pollution, Water pollution, Disasters, Water law, Treaties, Oil industry, Offshore platforms, Drilling, Legal aspects, Regulation, Oil wastes.
Identifiers: *Oil Pollution Act, *Environmental Protection Agency, *International Convention for Prevention of the Pollution of the Sea by Oil, Water Quality Improvement Act.

In 1970, an estimated five million tons of crude oil or petroleum products were spilled into the waters of the world, half of the major spills occurring within one mile of shore. Tankers and other ships accounted for one-fifth of the oil spilled, with inadequate equipment and negligent operation a major cause, as well as inadequate regulation by nations which allow ships to fly their flags of convenience. Inadequate facilities at refineries contribute another three hundred thousand tons of oil pollution. A lack of pollution control laws also aggravates the problem. Following a spill in Cape Cod's Buzzard Bay, a team of scientists using the most modern methods of chemical analysis and biological observation, concluded that crude oils were poisons to all marine organisms, and many crude oil distillates are even more poisonous due to higher proportions of toxic compounds. The Water Quality Improvement Act, administered by the Environmental Protection Agency, has given the government new tools to prevent and control oil pollution, but there are continuing problems of oil lumps at sea, spills from offshore oil drilling, and destruction of wildlife. (Ritchie-Florida)
W74-09315

MERCURY LEVELS IN FISH FROM SELECTED WISCONSIN WATERS (A PRELIMINARY REPORT),
Wisconsin Dept. of Natural Resources, Madison. Bureau of Research.
For primary bibliographic entry see Field 5A.
W74-09371

THE COOPER RIVER ENVIRONMENTAL STUDY.
For primary bibliographic entry see Field 2L.
W74-09379

STANDING CROPS OF AQUATIC ORGANISMS IN TIDAL STREAMS OF THE LOWER COOPER RIVER SYSTEM, SOUTH CAROLINA,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Estuarine Fisheries Center.
For primary bibliographic entry see Field 2L.
W74-09380

VERTICAL DISTRIBUTION OF EPIPHYTIC ALGAE ON SPARTINA ALTERNIFLORA FROM TRANSECTS ALONG THE COOPER AND WANDO RIVERS,
South Carolina Univ., Columbia.
For primary bibliographic entry see Field 2L.
W74-09381

REPORT ON 'IN SITU' BENTHIC RESPIRATION AND VERTICAL OXYGEN: TEMPERATURE PROFILES.
In: Cooper River Environmental Study: South Carolina Water Resources State Water Plan Report No 117, p 52-61, April 1974. 1 fig, 12 tab.

Descriptors: *Dissolved oxygen, *Estuaries, *Respiration, *South Carolina, *Oxygen demand, Water pollution, Water pollution effects, Water temperature, Reaeration, Mixing.
Identifiers: *Cooper River(SC).

Benthic respiration data were collected at pre-established stations on the Cooper River, South Carolina. A chamber was placed on the river bottom at each of eight pre-established, permanent, stations on the Cooper River. The eight stations were divided into two groups of four, and the dissolved oxygen within the chambers determined on alternate days. A zero, or initial reading, was taken in the morning; another reading was taken five hours later, and then again after 48 hours. Oxygen consumption is rapid during the initial five hours followed by a stabilization of the oxygen uptake during the balance of the 48 hour periods. This indicates a metabolic stabilization. The Cooper River is well oxygenated from surface to bottom. (See also W74-09379) (Knapp-USGS)
W74-09384

TOXICITY OF SODIUM NITRILOTRIACETATE (NTA) TO THE FATHEAD MINNOW AND AN AMPHIPOD IN SOFT WATER,
National Water Quality Lab., Duluth, Minn.
J. W. Arthur, A. E. Lemke, V. R. Mattson, and B. J. Halligan.
Water Research, Vol 8, p 187-193, March 1974. tab, 11 ref.

Descriptors: *Nitrilotriacetic acid, *Toxicity, *Bioassay, *Amphipoda, Minnows, Water pollution effects, Lethal limit, Sodium compounds.
Identifiers: NTA toxicity, *Fathead minnows, *Gammarus pseudolimnaeus.

Amphipods, Gammarus pseudolimnaeus Bousfield and fathead minnows, Pimephales promelas Rafinesque, were submitted to acute (96-h) and chronic (generation-cycle) bioassays with sodium nitrilotriacetic acid (NTA). All measurements are reported as Na3NTA. The average 96-h TL50 values under flow-through conditions were 98 mg/liter NTA for the amphipod and 114 mg/liter for the fathead minnow. The acute toxicity of NTA was caused in part by the high pH resulting from the addition of large amounts of NTA (greater than 100 mg/liter) to soft water. Controlling pH reduced the lethality of NTA by at least one-half to fathead minnow larvae. The chronic no-effect level of NTA to the amphipods was 19 mg/liter; in fathead minnows, it exceeded the highest exposure level (greater than 54 mg/liter). (EPA)
W74-09432

PHOSPHORUS STUDIES IN LOWER GREEN BAY, LAKE MICHIGAN,
Wisconsin Univ., Madison. Dept. of Water Chemistry.
N. Sridharan, and G. F. Lee.
Journal Water Pollution Control Federation, Vol 46, No 4, p 684-696, April 1974. 9 fig, 7 tab, 16 ref.

Descriptors: *Phosphorus compounds, *Sediments, *Water pollution, *Lake Michigan, Pollutants, Water pollution sources, *Wisconsin, Industrial wastes, Municipal wastes, Water quality, Biochemical oxygen demand, Turbidity, Lakes, Great Lakes, Limnology, Water analysis, Water pollution control, Rivers, Bays, Bottom sediments, Iron, Waste water(Pollution).
Identifiers: *Green Bay(Wisc), Fox River(Wisc).

Chemical analysis of Lake Michigan sediments suggested the presence of phosphorus in association with iron, and laboratory leaching experiments showed significant phosphorus release from Green Bay sediments under both aerobic and anaerobic conditions. The phosphorus budget for the Fox River, the major source of phosphorus in lower Green Bay, indicated that 60% of the total input came from municipal and industrial waste waters. By reducing the phosphorus concentrations in these waste waters by 80% (as a result of the Environmental Protection Agency-State of Wisconsin agreement) the total phosphorus input decreased by 50% in the Fox River water, and by 40% in the Bay as a whole. Because the water quality problems of lower Green Bay also include high BOD and turbidity, the removal of 80% of phosphorus from the waste water discharged in the tributaries of southern Green Bay produced little improvement of water quality in the southern part of the Bay. The removal of 80% of the phosphorus from the waste water sources is justified on the basis of protection of Lake Michigan from further water quality deterioration. (Witt-IPC)
W74-09435

AQUATIC MIDGE LARVICIDES, THEIR EFFICACY AND RESIDUES IN WATER, SOIL, AND FISH IN A WARM-WATER LAKE,
California Univ., Riverside. Dept. of Entomology.
For primary bibliographic entry see Field 5G.
W74-09443

EFFECTS OF A NATURAL FISH KILL ON THE WATER QUALITY, PLANKTON, AND FISH POPULATION OF A POND IN THE BIG CYPRESS SWAMP, FLORIDA,
Miami Univ., Coral Gables, Fla. Dept. of Biology.
J. A. Kushlan.
Transactions of the American Fisheries Society, Vol 103, No 2, p 235-243, April 1974. 3 fig, 4 tab, 18 ref.

Descriptors: Runoff, *Fishkill, *Dry seasons, *Water quality, *Water level fluctuations, *Plankton, *Swamps, Ponds, *Florida, Water levels, Low water mark, Oxygen, Aquatic microorganisms, Aquatic animals, Limnology, Surface waters, Water types, Aquatic life, Dissolved oxygen.
Identifiers: Big Cypress Swamp(Fla).

A naturally occurring fish kill took place during the southern Florida dry season of 1970 when receding water levels forced aquatic organisms out of shallow swamps and into a small pond. Physicochemical parameters of water quality varied greatly from their usual range, as did the abundance of phytoplankton which reached a peak of 2,500,000,000 cells/liter. The fish kill had no effect on the long-term limnological characteristics of the pond, as water quality returned to normal range within 2 months and phytoplankton disappeared within 1 month after the fish kill. The species of fish in the pond showed a range of susceptibility to low oxygen concentration and other aspects of the fish kill. They were classified into three categories based upon their survival: Notemigonus crysoleucas, Lucania goodei, and all centrarchids were eliminated rapidly; Fundulus chrysotus, Peocilia latipinna, Heterandria formosa, and Ictalurus natalis were either eliminated late in the fish kill or survived in numbers lower than measurable by methods used in this study; and Lepisosteus platyrhincus, Gambusia affinis, Jordanella floridae, and the prawn Palaemonetes paludosus survived the fish kill in moderate densities of 0.6 to 6 individuals/sq m. In three species of Lepomis, larger fish died before smaller ones. Six of 22 species of fish and only 0.6% of the previous fish population survived the fish kill. (Witt-IPC)
W74-09448

ON SPENT OF LIQUOR SEMICHEMICAL PULPING. PART III. TOXICITY CHARACTERISTICS OF SCP SPENT LIQUOR AND REDUCTION OF THE TOXICITY (IN JAPANESE),
Kyushu Univ., Fukuoka (Japan). Wood chemistry Lab.
R. Kondo, K. Sameshima, and T. Kondo.
Japan Tappi, Vol 27, No 10, p 476-485, Oct, 1973. 5 fig, 12 tab, 22 ref. English summary.

Descriptors: *Toxicity, *Pulp wastes, *Sulfite liquors, Fish, *Sulfur compounds, Hydrogen sulfide, Suspended solids, Lignins, Carbohydrates, Aeration, Irradiation, Ultraviolet radiation, Resistance, Duration curves, Time, Volatility, Water pollution effects.
Identifiers: Mercaptans, Methyl mercaptan(Methanethiol), Kraft mills, Black liquors, Spent pulping liquors, Neutral sulfite semichemical(NSSC) pulping, Spent sulfite liquors, Xylose, Monosaccharides, *Aplocheilus latipes, *Oryzias latipes.

The median tolerance limits (TLm) and the median survival times (MST) of two fish species (Aplocheilus latipes and Oryzias latipes) after 24 and 48 hr exposures to spent neutral sulfite semichemical (NSSC) pulping liquors were measured as toxicity indicators in comparison to kraft pulp effluents. The 48-hr TLm (in terms of COD) was 2340 ppm for neutralized spent NSSC liquor, compared to 755 ppm for kraft mill wastes, indicating a much lower toxicity for the NSSC effluent. However, this toxicity did not decrease appreciably over a period of several days, whereas that of the kraft effluent decreased daily, probably due to the volatilization of methyl mercaptan and hydrogen sulfide. Neither eaeration nor ultraviolet irradiation decreased the toxicity of the spent NSSC liquor, whereas kraft liquor responded well to such treatments. The difference is attributed to interference of suspended solids with these treatments upon prolonged storage. The stable toxicity of the NSSC liquor is thought to come partly from xylose in the suspended matter. (Brown-IPC)
W74-09454

A BENTHOS SURVEY (1972) IN THE NORTH SASKATCHEWAN RIVER IN THE VICINITY OF THE PRINCE ALBERT PULP COMPANY, PRINCE ALBERT, SASKATCHEWAN,
Department of the Environment, Winnipeg (Manitoba). Fisheries and Marine Service.
L. A. Gregory, and J. S. Loch.
Technical Report Series No. CEN T-73-2, March, 1973, 24 p. 2 fig, 5 tab, 9 ref.

Descriptors: *Water pollution effects, *Pulp wastes, *Water pollution sources, Rivers, *Benthic fauna, Effluents, Waste water(Pollution), Fibers(Plant), Solid wastes, Canada, Discharge(Water), Aquatic environment, Organic loading, Waste water treatment, Treatment facilities.
Identifiers: *Saskatchewan River(Canada), Prince Albert Pulp Co.(Prince Albert, Saskatchewan).

The benthic community in the North Saskatchewan River in the vicinity of a bleached kraft pulp mill was surveyed during August 1972. Substrate analyses showed little organic content and suggested that the mill's primary and secondary effluent treatment processes are effectively removing most of the residual wood fibers. The sand-clay substrate restricted the number of representative benthic general present. Qualitative assessments based on chironomids indicated that some pollution effects existed below the mill's outfall, but the presence of pollutant-sensitive Ephemeroptera, Odonata, and Trichoptera throughout the river stretch examined supported the conclusion that no severe pollution problems are posed by the pulp mill operation. (Witt-IPC)
W74-09459

BENTHOS STUDIES (1971 AND 1972) ON THE WINNIPEG RIVER IN THE VICINITY OF THE ABITIBI MANITOBA PAPER COMPANY, PINE FALLS, MANITOBA,
Department of the Environment, Winnipeg (Manitoba). Fisheries and Marine Service.
L. A. Gregory, and J. S. Loch.
Technical Report No CEN T-73-3, June, 1973, 37 p. 5 fig, 6 tab, 14 ref.

Descriptors: *Water pollution sources, *Water pollution effects, Fibers(Plant), *Pulp wastes, Rivers, *Benthic fauna, *Canada, Effluents, Industrial wastes, Discharge(Water), Waste water(Pollution), Fish hatcheries, Fish, Fish behavior, Aquatic environment, Liquid wastes, Solid wastes, Wood wastes, Toxicity.
Identifiers: *Winnepeg River(Canada), Abitibi Manitoba Paper Co.(Pine Falls, Manitoba), Log booms, Sublethal effects.

Benthic surveys were conducted in the summers of 1971 and 1972 to assess the condition of the Winnipeg River in the neighborhood of Abitibi Manitoba Paper Co.'s integrated newsprint mill. Qualitative and quantitative analyses of the collected data (including diversity indices for aquatic genera) indicated that the benthic community is moderately to severely affected in the vicinity of the mill's effluent outfall, and that heavy to moderate pollution effects extend up to 4 miles downstream. The mill's discharge consists of both liquid and solid wastes (wood fibers), the latter originating also from the log boom. Fiber deposits have been shown in earlier studies to affect the hatching of fish eggs and the survival of fry. Removal of this fiber source would benefit the aquatic community. (Witt-IPC)
W74-09460

THE EFFECTS OF WATER FLOW MANIPULATION BELOW THE HYDROELECTRIC POWER

DAM ON THE BOTTOM FAUNA OF THE UPPER KENNEBEC RIVER, MAINE,
Maine Cooperative Fishery Unit, Orono.
H. M. Trotzky, and R. W. Gregory.
Transactions of the American Fisheries Society, Vol 103, No 2, p 318-324, April, 1974. 3 fig, 2 tab, 9 ref.

Descriptors: *Water level fluctuations, *River flow, *Maine, *Benthic fauna, *Aquatic life, Aquatic insects, Hydroelectric plants, Fluctuations, Impounded waters, Rivers, Water sampling, Dams, Streamflow, Discharge(Water), Hydraulic structures, Engineering structures.
Identifiers: *Kennebec River(Maine), Wyman Dam(Maine).

The effect of severe fluctuations in water flow on the distribution of bottom fauna of the upper Kennebec River was studied. During the years 1964-1970, discharge below Wyman Dam ranged from 8.5 cu m/sec to an average daily high of about 170 cu m/sec. Slow currents resulting from low flows appeared to limit the diversity and abundance of swift-water aquatic insects on the river bottom below the dam. Sampling stations above the impoundment averaged 19 aquatic insect genera, while those below the dam averaged 11. About 19 genera were found at stations where the current near bottom fluctuated from 0.5 m/sec to 0.9 m/sec, while only 4 genera were found at stations where the fluctuations were from 0.1 to 0.5 m/sec. Aquatic insects adapted for swift water, such as Rhyacophila, Chimarra, Iron, Blepharocera, Acroneuria, and Paragnetina, were more abundant above the impoundment than below, and were absent from those stations below the impoundment with the lowest current velocities. (Witt-IPC)
W74-09462

BIOLOGICAL MONITORING OF THE FRASER RIVER NEAR PRINCE GEORGE, B.C.,
Beak (T.W.) Consultants Ltd., Toronto (Ontario).
D. Stone, T. C. Griffing, and M. C. Knight.
Pulp and Paper Magazine of Canada, Vol 75, No C (Convention issue), p 100-106 (Technical Paper T110), March, 1974. 7 fig, 19 ref.

Descriptors: Rivers, *Monitoring, *Fish, *Surveys, *Effluents, Aquatic life, *Canada, Aquatic environment, Water pollution, Water pollution effects, Waste water treatment, Pulp and paper industry, Pulp wastes, Industrial wastes, Water pollution sources, Water analysis, Analytical techniques, Biota, Biological treatment.
Identifiers: Water biology, *Fraser River(B.C.-Canada).

A biological survey was made of the Fraser River near Prince George, British Columbia, before and after startup of 3 kraft pulp and paper mills, for the purpose of determining the possible effects of mill effluent on the biological conditons of the river. The objectives were to document pre-operational baseline conditons and to detect and measure possible mill-induced changes so that corrective measures could be taken if necessary. Biological surveys were conducted twice in 1963, four times in 1964, and annually thereafter through 1970. The original study was sponsored by Prince George Pulp and Paper Company and was joined later by Northwood Pulp Company and by Intercontinental Pulp Company. The survey program is described and salient features of the data, methods of analysis, and conclusions are presented. The general good condition of the river after receiving effluent discharges indicates that the waste treatment systems at the mills are functioning satisfactorily. (Buchanan-IPC)
W74-09463

THE ENVIRONMENTAL IMPACT CONCEPT, AND ITS EFFECT ON THE NATIONAL GAS INDUSTRY,
Southwest Research Inst., San Antonio, Tex.
A. R. Schleicher.
American Gas Association Monthly, Vol 56, No 4, p 21-25, April, 1974.

Descriptors: *Environmental effects, *Natural gas, Evaluations, Federal government, Environmental control.
Identifiers: *Environmental impact statements, *Natural gas industry.

The environmental impact concept and its effect on the natural gas industry are discussed. Organizations are required to evaluate anticipated environmental effects of their actions and decision making processes. A draft of the evaluation must be circulated 90 days prior to the action, and a final statement is due at the Environmental Protection Agency 30 days before the action is scheduled. Practically all sectors of the gas industry are being effected by the new requirements. Producers may encounter federal requirements for environmental reports when operations involve federal or Indian lands, or offshore locations. Segments of the industry involved in gas transmission are acutely aware of the influence of environmental questions, since most of their construction activities involve federal authorization. Most companies involved in the environmental impact process find it necessary to seek the aid of outside consultants. But, decision makers in the natural gas industry should develop their own practical appreciation of the scope and intent of current environmental policies and the way the system works. (Merritt-FIRL)
W74-09489

CADMIUM TOXICITY AND BIOCENTRATION IN LARGEMOUTH BASS AND BLUEGILL,
Oklahoma Univ. Health Sciences Center, Oklahoma City. Dept. of Environmental Health.
J. E. Cearley, and R. L. Coleman.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 2, p 146-151, 1974. 4 fig, 7 ref.

Descriptors: *Cadmium, *Bass, *Sunfishes, Animal behavior, Animal growth, Growth rates, Environmental effects, Animal diseases, Investigations, Evaluations, *Water pollution effects, Water analysis, *Toxicity.
Identifiers: Accumulation, Nervous system, Exposure.

The effects of subacute exposure to cadmium in the largemouth bass and bluegill were evaluated based on observations of behavioral effects, rate of growth, survival, and tissue and organ accumulation of cadmium. Exposure to cadmium in concentrations ranging from 0.0005 to 0.85 mg/liter resulted in accumulation of the metal in concentrations greater than those of the water. The quantity of metal accumulated increased as the exposure concentration increased. An equilibrium developed between the concentrations of the metal in the water and in the tissues after approximately 2 months. Metal accumulations on the bass tissues were higher in the internal organs, followed by the gills and the remainder of the body. The bass were more sensitive to cadmium than the bluegill. Abnormal behavior patterns observed in both species suggested that the nervous system was the site of damage. (Merritt - FIRL)
W74-09492

NUTRIENTS AND AQUATIC VEGETATION EFFECTS,
New York State Dept. of Health, Albany. Div. of Labs. and Research.
G. W. Fuhs.
Journal of the Environmental Engineering Division, American Society of Civil Engineers Vol 100, No EE2, p 269-278, April, 1974. 1 tab, 14 ref.

Descriptors: *Eutrophication, *Ecosystems, *Nutrient removal, *Phosphorus, Aquatic life, Streams, Rivers, Reservoirs, Water pollution sources, Water pollution control, Land use, Surface runoff, Nitrogen, Productivity, Soils.
Identifiers: *Nutrient pollution.

The effect of nutrient pollution and nutrient removal on aquatic ecosystems is discussed. Because the increase in productivity of streams and rivers is difficult to control, measures to control eutrophication of inland lakes and reservoirs must center around control of total phosphorus loadings. To the extent that excessive phosphorus loadings are in part or totally due to discharges from point sources, these sources must be controlled. In many lakes, however, inputs from natural and other nonpoint sources are significant. Such inputs must be determined as a basis for evaluating total control needs with respect to projected best usage and, in consequence, the desirability and feasibility of control of nonpoint sources and land use. It is hoped that continued studies of land runoff will soon provide an overall view of phosphorus runoff from natural sources, so that runoff numbers will be available for most watersheds of New York State and other areas of the United States. The control of eutrophication in coastal waters requires the control of nitrogen discharges. (Merritt - FIRL)
W74-09498

SOME PRACTICAL ASPECTS CONCERNING THE USE OF THE MOLLUSCICIDE N-TRITYLMORPHOLINE (FRESCON) FOR THE CONTROL OF FASCIOLIASIS,
Shell Research Ltd., Sittingbourne (England). Woodstock Agricultural Research Centre.
N. O. Crossland.
Helminthologia (Bratisl). 10. p 83-91. 1969.
Identifiers: Amphibians, Control, *Fasciola hepatica, Fascioliasis, Fish, *Frescon, Leech, *Lymnaea-truncatula, *Molluscicides, Morpholine, Toxicity.

The molluscicide N-tritylmorpholine (Frescon shows promise for the control of Lymnaea truncatula, snail host of Fasciola hepatica. N-Trityl morpholine is very effective against L. truncatula when sprayed on pastures in dosages within the range 0.25-0.5 kg/ha. It has no effect on plants and no known biological activity against terrestria animals of any kind. Various species of aquatic snails, leeches, fish and amphibians may be affected. The molluscicide may be applied with a variety of equipment including knapsack sprayers tractor-mounted sprayers and aircraft. Provided that the soil is wet and vegetation does not impede penetration to soil level the volume of spray liquid has no influence on effectiveness. The relative merits of spring and autumn applications with N tritylmorpholine are discussed. Autumn treatment is generally aimed at preventing losses due to outbreaks of acute fascioliasis and depends on system of forecasting outbreaks of outbreaks of disease. Routine spring treatment of snail habitat may be preferred to limit the prevalence of chronic liasis. N-Tritylmorpholine should be applied when the soil is wet and likely to remain so. Penetration is best achieved when the grass is short. Such conditions predictably occur in the spring but may also occur in the autumn, especially following wet summers.--Copyright 1973 Biological Abstracts, Inc.
W74-09525

BACTERIOLOGICAL WATER QUALITY AND INCIDENCE OF WATERBORNE DISEASES IN A RURAL POPULATION,
S. N. Medical Coll., Agra (India).
B. K. Trivedi, H. S. Gandhi, and N. K. Shukla.
Indian J Med Sci, 25(11): 795-801, 1971.
Identifiers: *Bacteriological studies, Chlorination, Dysentery, Enteritis, Human disease, *India(Kanpur), Rural populations, *Water quality, *Water-Borne diseases, *Water wells.

The incidence of waterborne diseases in 48 wells in 3 villages in Kanpur (India) was reported. The relationship between the bacteriological quality of drinking water and the effect of chlorination wi

observed. Chlorination with 0.5 ppm of residual chlorine was best in reducing bacteriological contents of well water. Of 162 human cases of waterborne diseases, the majority were of gastroenteritis followed by dysentery. The incidence of waterborne diseases was compared for the control group and those served by the experimental wells. Chlorination reduced the incidence of waterborne diseases in the experimental wells when compared to the same period in previous yr.--Copyright 1973, Biological Abstracts, Inc.
W74-09540

HEALTH EFFECTS OF ENVIRONMENTAL POLLUTANTS,
G. L. Waldbott.
C. V. Mosby Company, Saint Louis, Missouri. 1973. 316 p.

Descriptors: *Air pollution effects, *Diseases, *Pollutants, *Public health, Air pollution, Human diseases.
Identifiers: *Environmental pollutants, *Health effects.

The health effects of air-born pollutants are examined, and they are classified according to their specific effect on the human body. Much of the data used in making these correlations has been obtained from animal experiments and occupational exposures to high concentrations. Part I considers the sources and action of the various pollutants, and the body's defenses against the pollutants. Part II considers the specific health effects of the various pollutants and classifies them into the following agents: (1) fibrosis-producing agents, (2) granuloma-producing agents, (3) fever-producing agents, (4) asphyxiating pollutants, (5) systemic poisons, (6) allergenic agents, (7) carcinogens, and (8) mutagenic pollutants. Part III, entitled Special Situations, considers the effects of economic poisons, hydrocarbons, radioactive substances, smoking, water pollution, and fires. Part III also contains a chapter dealing with the prophylaxis and treatment of diseases caused by air pollution. (Martino-NWWA)
W74-09547

MERCURY AND OTHER METALS IN BRITISH SEALS,
Institute for Marine Environmental Research, Lowestoft (England). Fisheries Lab.
For primary bibliographic entry see Field 5B.
W74-09571

NORTHWEST FISHERY CENTER RESEARCH ON EFFECTS OF ENVIRONMENTAL CONTAMINANTS ON MARINE ORGANISMS,
National Marine Fisheries Service, Seattle, Wash. Northwest Fisheries Center. Environmental Conservation Division.
M. E. Stansby, and D. L. Alverson.
Marine Fisheries Review, Vol 35, Nos 5-6, p 8-14, 1973. 7 photos.

Descriptors: *Research and development, *Contaminants, *Marine fish, *Water pollution effects, Analytical techniques, Marine plants, Industrial wastes, Oil, Heavy metals, Pesticides.

Associated with many previous investigations by other researchers has been the erroneous overt or inadvertent implication that when the amounts of contaminants in fish (such as DDT and mercury) exceed the level deemed safe for human consumption, the contaminants must be doing harmful things to the animals themselves. The aim of the program at the Northwest Fishery Center is to assess the physiological or biochemical damage resulting from different levels of contaminants which may be incorporated through various mechanisms into marine organisms. New studies initiated at the NWFC will employ contaminants presented to fish in their feed at levels comparable to those encountered by fish in their natural environment. The contaminants to be studied will include the pesticide endosulfan, PCB's, and petroleum oil components. The investigation into the effects of contaminants upon fish will involve a three-pronged attack: (1) biochemical investigations looking into pathways within the fish of contaminants, (2) physiological studies aimed at determining the effects of environmental alterations and contaminants on marine and anadromous species, (3) field research operations which conduct practical tests in the natural environment based upon laboratory findings. (Jernigan-Vanderbilt)
W74-09572

A SURVEY OF TRACE METALS IN HUMAN HAIR,
Lamar Univ., Beaumont, Tex. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W74-09573

MERCURY IN TUNAS: A REVIEW,
Inter-American Tropical Tuna Commission, La Jolla, Calif.
For primary bibliographic entry see Field 5B.
W74-09574

EXCRETION AND ABSORPTION OF METHYL MERCURY AFTER POLYTHIOL RESIN TREATMENT,
Rochester Univ. Medical Center, N.Y. Dept. of Radiation Biology and Biophysics.
T. W. Clarkson, H. Small, and T. Norseth.
Archives of Environmental Health, Vol 26, No 4, p 173-176, April 1973. 2 fig, 1 tab, 12 ref.

Descriptors: *Mercury, *Laboratory tests, *Rodents, Movement, Toxins, Inorganic compounds, Laboratory animals, Foods, Testing procedures, Public health, *Absorption.
Identifiers: *Methyl mercury.

Results are reported of feeding to mice a polystyrene resin containing fixed sulfhydryl groups. Test involved the effects of the resin on the rate of excretion of methyl mercury and also on the gastrointestinal absorption of methyl mercury compounds in food. A synthetic polythiol resin when added to food at a concentration of 1% doubled the rate of excretion of mercury from mice given a simple dose of methyl mercuric chloride. After 42 days of resin treatment the levels of mercury in blood, brain, kidney, and liver had been reduced by factors of 7.2, 6.0, 7.2, and 10.0, respectively, as compared with those in untreated animals. The resin also reduced by 50% the rate of absorption of methyl mercury compounds from food. (Jernigan-Vanderbilt)
W74-09575

BONE CHANGES IN EXPERIMENTAL CHRONIC CADMIUM POISONING, RADIOLOGICAL AND BIOLOGICAL APPROACHES,
Kyoto Univ., (Japan). Dept. of Hygiene.
Y. Itokawa, T. Abe, and S. Tanka.
Archives of Environmental Health, Vol 26, p 241-244, May 1973. 3 fig, 3 tab, 9 ref.

Descriptors: *Cadmium, *Laboratory tests, *Rodents, Industrial wastes, Laboratory animals, Human diseases, Public health, Toxicity, Diets, Growth rates.
Identifiers: Calcium deficiency, Bone damage.

The following experiments were undertaken to test the hypothesis that calcium deficiency coupled with cadmium poisoning is responsible for Itai Itai disease. To clarify the relationship between chronic cadmium poisoning and bone abnormalities, male Wistar rats were separated into eight groups given eight different synthetic diets. After four weeks of these dietary regimens the rats were killed and examined roentgenographically. Muscles and bones were removed and analyzed for cadmium, calcium, magnesium, and zinc. The most remarkable x-ray finding was the abnormal curvature of the spinal column. Cervicodorsal lordosis and dorsolumbar kyphosis as well as scoliosis increased markedly in rats fed a low-protein, calcium-deficient, and cadmium-added diet. Cadmium levels increased and magnesium and zinc levels decreased in bones of cadmium-dosed groups. Calcium levels in red muscle (soleus) and white muscle (gastrocnemius) were significantly elevated in rats on a low-protein, calcium-deficient, and cadmium-added diet. (Jernigan-Vanderbilt)
W74-09576

BRAIN ALUMINUM DISTRIBUTION IN ALZHEIMER'S DISEASE AND EXPERIMENTAL NEUROFIBRILLARY DEGENERATION,
Toronto Univ. (Ontario). Dept. of Physiology.
D. R. Crapper, S. S. Krishnan, and A. J. Dalton.
Science, Vol 180, p 511-513, May 1973. 1 tab, 8 ref.

Descriptors: *Aluminum, *Human pathology, *Animal pathology, Human diseases, *Toxicity, Public health, Laboratory animals, Laboratory tests, Analytical techniques, Spectroscopy, Industrial wastes.
Identifiers: *Alzheimer's disease, *Felines.

In the early stages of an aluminum chloride-induced encephalopathy in cats, an apparently selective impairment in short-term memory and associative learning preceded the appearance of focal neurological signs. The decline in higher nervous functions resembled in part those noted in the human conditions of presenile and senile demention of the Alzheimer type. A study of the aluminum concentration in the brain of cats with acquisition defects was undertaken in order to establish the tissue concentration at which morphological and behavioral changes occurred. In addition, the aluminum content of the brain was determined in humans with Alzheimer's disease. The variation in aluminum concentration in cortical regions is noteworth in relation to the characteristic pathological finding in Alzheimer's disease of the patchy distribution of neurofibrillary degeneration (NFD). The density of NFD in the experimental model is often very much higher than that encountered in Alzheimer's disease. Nevertheless, the surprisingly high tissue concentration of 9 to 11 micrograms/g in some regions of brain in Alzheimer's disease, compared to the average values of 14 micrograms/g in cat brain with experimental NFD, suggests that aluminum may be a neurotoxic factor in the human disease. (Jernigan-Vanderbilt)
W74-09579

HEAVY METAL ESTIMATION IN BIOLOGICAL SYSTEMS,
Bristol Univ. (England). School of Chemistry.
For primary bibliographic entry see Field 5B.
W74-09580

COAL MINING AND ITS EFFECT ON WATER QUALITY,
Ohio Univ., Athens. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W74-09592

CHANGES IN OXYGEN AND PRIMARY PRODUCTION OF THE PATUXENT ESTUARY, MARYLAND, 1963 THROUGH 1969,
Geological Survey, Edgewater, Md.
For primary bibliographic entry see Field 5B.
W74-09624

LIMNOLOGICAL STUDIES OF LAKE JACOMO, JACKSON COUNTY, MISSOURI. II. THE DYNAMICS OF THE MACROBENTHOS AND ITS RELATIONSHIP TO WATER QUALITY AND PLANKTON DISTRIBUTION IN

LAKES JACOMO AND PRAIRIE LEE, WITH A NOTE ON THE SPORT FISHERY, 1971-1972,
Missouri Univ., Kansas City. Dept. of Biology.
M. S. Stern, and D. H. Stern.
Available from the National Technical Information Service as PB-233 691, $4.00 in paper copy, $1.45 in microfiche. Missouri Water Resources Research Center, Columbia, Completion Report, June 1974. 75 p, 22 fig, 7 tab, 29 ref. OWRR A-052-MO(1). 14-31-0001-3525.

Descriptors: *Benthos, Aquatic insects, Algae, *Plankton, *Water quality, Recreation, *Eutrophication, Sport fishery, *Missouri, Lakes, Nutrients, *Mollusks, *Cyanophyta, Sunfishes, Phosphates, *Diptera.
Identifiers: *Lake Jacomo(Mo), Nitrate nitrogen, Prairie Lee Lake(Mo), Aphanizomenon flos-aquae, Musculium truncatum.

The macrobenthos and its relationship to the plankton and water quality were studied for a year in two adjacent recreational reservoirs, Lakes Jacomo and Prairie Lee. These primary recreational waters for metropolitan Kansas City, with more than 2 million visits annually, have been culturally eutrophicated. Both lake shorelines are dissected, and the watershed and privately owned shoreline areas of Prairie Lee Lake provide nutrients that promote nuisance Cyanophyta blooms in both lakes. Nitrate nitrogen mean concentrations ranged from 0.05-0.50 ppm, while those for orthophosphate ranged from 0.04-0.24 ppm. There were 74 macrobenthic and 151 plankton taxa collected. Insects, primarily Diptera, dominated the macrobenthos in Lake Jacomo, while molluscs were dominant in Prairie Lee Lake. The maximum standing crops were 1952/sq. ft. in Lake Jacomo in October and 4256/sq. ft. in Prairie Lee Lake in December. Diptera comprised 59% of the total macrobenthos in Lake Jacomo, while molluscs, mostly Musculium truncatum, made up 76% of it in Prairie Lee Lake. Cyanophyta, particularly Aphanizomenon flos-aquae, dominated the plankton for the second successive year. The sport fishery in Lake Jacomo has been decreasingly dominated by bluegill. The mean catch per angler over a five-year period was 1.5 fishes, and the mean catch per hour was 0.58 fish. (See also W72-10431)
W74-09660

SIFE CONCENTRATION AND SPECIFIC ACTIVITIES IN NORTH PACIFIC MARINE ORGANISMS,
Battelle-Pacific Northwest Lab., Richland, Wash.
C. E. Jenkins, and J. C. Langford.
IEEE Transactions on Nuclear Science, Vol NS-21, No 1, p 517-521, February, 1974. 8 fig, 16 ref.

Descriptors: Iron, *Salmon, Marine fish, Sea water, *Pacific Ocean, *Alaska, Food chains, *Radionuclides, Investigations, Aquatic environment, Environmental effects.
Identifiers: *Iron-55.

Marine organisms have been shown to have up to 1600-fold higher specific activities of iron-55 than that in seawater; also iron-55 specific activities increase 10 to 30-fold in salmon between mid and northern latitudes. These observations are currently explained on the basis of a different chemical form for iron-55 in seawater and greater dilution of the iron-55 by stable iron at mid-latitudes than at the northern latitudes. The half-time for iron-55 concentrations in mature harvested salmon at all latitudes is approximately 10 months, which is comparable to the half-time for movement of stratospheric debris to the earth's surface. (Sandoski-FIRL)
W74-09733

CADMIUM UPTAKE BY WHEAT FROM SEWAGE SLUDGE USED AS A PLANT NUTRIENT SOURCE, A COMPARATIVE STUDY USING FLAMELESS ATOMIC ABSORPTION AND NEUTRON ACTIVATION ANALYSIS,
Karolinska Institutet, Stockholm (Sweden). Dept. of Environmental Hygiene.
L. Linnman, A. Andersson, K. O. Nilsson, B. Lind, and T. Kjellstrom.
Archives of Environmental Health, Vol 27, No 1, p 45-47, July 1973. 1 fig, 4 tab, 7 ref.

Descriptors: *Cadmium, *Sewage sludge, *Environmental sanitation, *Crop production, *Wheat, Industrial wastes, Analytical techniques, Testing procedures, Effluents, Nutrients, Sludge disposal, *Neutron activation analysis, Spectroscopy, Pollutant identification.

Wheat has been grown in tests pots at four different sewage sludge concentrations and three different pH levels in order to study the cadmium uptake from sewage sludge. The sludge contained 10 parts per million (ppm) cadmium, which is below the average cadmium concentration in sludge from Swedish sewage sludge plants. The analysis of cadmium in wheat has been performed by two methods, atomic absorption and neutron activation analysis, and good agreement was found between results from the methods. The results show that the cadmium uptake increases strongly with increasing sewage sludge concentrations. It can be concluded beyond any doubt that cadmium from sewage sludge used as a plant nutrient source is resorbed by plants. The pH of the soils was found to be of great importance for the uptake of cadmium. Lower pH gave greater cadmium uptake. (Jernigan-Vanderbilt)
W74-09758

MERCURY IN HUMAN HAIR, A STUDY OF THE RESIDENTS OF LOS ALAMOS, NM, AND PASADENA, CALIF., BY COLD VAPOR ATOMIC ABSORPTION SPECROPHOTOMETRY,
Cincinnati Univ., Ohio. Coll. of Medicine.
For primary bibliographic entry see Field 5A.
W74-09759

INTERFERENCES IN THE DETERMINATION OF METALLIC ELEMENTS IN HUMAN HAIR, AN EVALUATION OF ZINC, COPPER, LEAD AND CADMIUM USING ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Cincinnati Univ., Ohio. Coll. of Medicine.
For primary bibliographic entry see Field 5A.
W74-09760

LEAD AND VITAMIN EFFECTS ON HEME SYNTHESIS,
Illinois University, Urbana. Dept. of Animal Science.
R. L. C. Kao, and R. M. Forbes.
Archives of Environmental Health, Vol 27, No 1, p 31-35, July 1973. 2 fig, 5 tab, 54 ref.

Descriptors: *Lead, *Vitamins, *Toxicity, *Rodents, Laboratory tests, Laboratory animals, Testing procedures, Heavy metals, Animal metabolism.
Identifiers: Vitamin B12, Ascorbic acid, *Heme synthesis.

When a purified diet was supplemented with 300 ppm lead as the acetate and was fed to weanling rats, significant decreases in feed intake, weight gain, and blood heme were observed. In vitro heme synthesis in blood from these lead-treated animals was increased by a single injection of niacin or vitamins C + B12; pyridoxine, thiamine, or riboflavin had no effect. Exposure to diet lead concentrations of 50, 150, and 300 ppm produced a significant and graded increase of urinary delta-aminolevulinic acid (ALA) within 18 hours, followed by a gradual decrease. A tenfold dietary excess of niacin provided no significant protection against toxic reactions from lead in terms of in vivo blood heme levels, in vitro heme synthesis, or urinary ALA. (Jernigan-Vanderbilt)
W74-09761

LEAD CONCENTRATION FOUND IN HUMAN BLOOD IN ASSOCIATION WITH LEAD COLIC,
Yugoslav Academy of Sciences and Arts, Zabreb. Inst. for Medical Research.
T. Beritic.
Archives of Environmental Health, Vol 23, No 4, p 289-291, October 1971. 1 tab, 1 ref.

Descriptors: Lead, *Human pathology, *Analytical techniques, Industrial wastes, Absorption, Toxicity.
Identifiers: *Lead colic, *Yugoslavia.

Results discussed of a study of 64 patients suffering from lead intoxication. The diagnosis of lead colic was based upon the existence of severe attacks of spasmodic abdominal pain preceded, accompanied, or followed, invariably, by obstinate constipation. In some of the most severe cases of lead poisoning the levels of concentration of lead in the blood were found to be remarkedly low. Blood was drawn from all subjects for lead analysis before any therapeutic measures were undertaken, and the specimens analyzed in parallel by a modification of the dithizone method. Specimens analyzed by this method are deemed to be abnormal when the concentration of lead is in excess of 70 micrograms/100 ml. For 13 of the 64 patients, levels ranged from somewhat less than 40 micrograms/100 ml to just 80 micrograms/100 ml. It is concluded that the finding of a low level of lead content in the blood, of itself, is not always a proper basis for the diagnostic exclusion of lead intoxication. (Jernigan-Vanderbilt)
W74-09764

REDUCTION IN MERCURY CONTENT OF FISH PROTEIN CONCENTRATE BY ENZYMATIC DIGESTION,
Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
M. C. Archer, B. R. Stillings, S. R. Tannenbaum, and D. I. C. Wang.
Agricultural and Food Chemistry, Vol 21, No 6, p 1116, November/December 1973. 1 tab, 10 ref.

Descriptors: *Mercury, *Fish, *Proteins, *Enzymes, Laboratory tests, Analytical techniques, Spectroscopy, Food processing industry, Heavy metals.
Identifiers: *Enzymatic digestion, Proteolysis.

During the processing of fish into FPC (fish protein concentrate) by isopropyl alcohol extraction, the protein is concentrated by a factor of 4-6, with a corresponding fivefold enhancement of mercury concentration. This indicates that little or no mercury is extracted from fish during concentrate manufacture. The amount of mercury can be reduced in FPC by proteolytic digestion. A two- to sevenfold concentration of mercury in the insoluble FPC fraction and corresponding reduction in mercury level in the soluble FPC fraction was achieved after proteolysis. In 1 hr roughly 90% of the mercury remained in the insoluble fraction whereas only 10% was in the soluble product; after 6 hr, roughly 80% of the mercury was found in the insoluble fraction and 20% in the soluble product. The concentrations of mercury in the enzyme-resistant fraction may mean that either the mercury is bound to an extremely enzyme-resistant fraction or the presence of mercury in the protein lends the property of enzyme resistance. On the basis of these results, the biological availability of Hg is about 20%, assuming that the insoluble fraction passes the gut unabsorbed. (Jernigan-Vanderbilt)
W74-09766

BERYLLIUM-INDUCED ULTRASTRUCTURAL CHANGES IN INTACT AND REGENERATING LIVER,
Pittsburgh Univ., Pa. Dept. of Pathology.
P. J. Goldblatt, M. W. Lieberman, and H. Witschi.

Archives of Environmental Health, Vol 26, p 48-56, January 1973. 12 fig, 1 tab, 44 ref.

Descriptors: *Beryllium, *Laboratory tests, *Laboratory animals, *Human diseases, Toxicity, Public health, Rodents, Animal pathology, Cytological studies, Heavy metals.
Identifiers: Liver necrosis, Cancer, *DNA.

A light and electron microscopic examination of resting and regenerating liver was undertaken to further document the subcellular effects of the Be compounds and provide structural correlates for the growing body of biochemical observations. Intact or partially hepatectomized male rates were given intravenous aqueous BeSO4-4H2O. Light microscope studies of partially hepatectomized animals examined at 6, 12, 24, and 48 hours after injections of 15, 30, or 60 micromals BeSO4 per kilogram or given 30 micromols BeSO4 per kilogram 8, 12, and 22 hours after partial hepatectomy and killed at 28 hours, revealed liver necrosis in animals surviving 48 hours, and abolition of mitoses in animals treated 16 or 20 hours before death. Ultrastructural alterations in both intact and partially hepatectomized animals examined 24 hours following Be injection included vacuolization and dense deposits in lysosomes, loss of fibrils and appearance of dense plaques in some nucleoli, and distoration of bile canaliculi. The lysosomal changes and inhibition of mitosis correlate well with previous biochemical studies. The exact mechanism by which Be induces inhibition of DNA synthesis and hepatic necrosis remains to be elucidated by further studies. (Jernigan-Vanderbilt)
W74-09769

HEAVY ELEMENTS IN SURFACE MATERIALS: DETERMINATION BY ALPHA PARTICLE SCATTERING,
Chicago Univ., Ill. Enrico Fermi Inst.
For primary bibliographic entry see Field 5A.
W74-09770

ISOLATION OF (BETA SUB 2)-MICROGLOBULIN FROM THE URINE OF PATIENTS WITH ITAI-ITAI (OUCH-OUCH) DISEASE,
National Inst. of Industrial Health, Kawasaki (Japan). Dept. of Occupational Diseases.
For primary bibliographic entry see Field 5A.
W74-09771

SIGNIFICANCE OF LEAD ISOTOPE COMPOSITION IN BLOOD,
Texas Univ., Dallas, Inst. for Geological Sciences.
For primary bibliographic entry see Field 5A.
W74-09772

GASTROINTESTINAL ABSORPTION OF DIFFERENT COMPOUNDS OF 115M CADMIUM AND THE EFFECT OF DIFFERENT CONCENTRATIONS IN THE RAT,
National Environmental Research Center, Cincinnati, Ohio. Environmental Toxicology Research Div.
J. Moore, Jr., J. F. Stara, and W. C. Crocker.
Environmental Research, Vol 6, p 159-164, 1973. 2 fig, 2 tab, 9 ref.

Descriptors: *Cadmium, *Toxins, *Laboratory tests, *Rodents, Public health, Laboratory animals, Testing procedures, Distribution patterns, Absorption, Animal metabolism.
Identifiers: Dosage.

The effect, if any, of different chemical compounds of 115m cadmium upon gastrointestinal absorption, retention, and tissue distribution and the effect of different concentrations of cadmium upon absorption were studied in female rats. After single oral dose, the chloride, sulfate, and citrate forms of 115m Cd did not significantly influence the absorption, retention, or distribution of the 115m Cd in the tissues. The only organs containing significant amounts of 115m Cd were the liver, kidney, and gastrointestinal tract. Increases in concentration of cadmium resulted in more cadmium being absorbed from the gastrointestinal tract, although the amount absorbed was not proportional to the increase in concentration. The results showed that only 3-5% of a given oral dose of the cadmium compounds tested is absorbed with considerable variation among animals. Cadmium absorption was increased considerably by low intake of calcium and protein in animals; it appears that a similar effect would occur in man. (Jernigan-Vanderbilt)
W74-09778

CADMIUM, NICKEL, LEAD, AND ZINC IN EARTHWORMS FROM ROADSIDE SOIL,
Bureau of Sport Fisheries and Wildlife, Washington, D.C. Div. of Wildlife Refuges.
C. D. Gish, and R. E. Christensen.
Environmental Science and Technology, Vol 7, No 11, p 1060-1062, November 1973. 2 tab, 16 ref.

Descriptors: *Cadmium, *Lead, *Zinc, *Soil contamination, *Annelids, Nickel, Toxicity, Air pollution, Path of pollutants, Public health, Heavy metals, Measurement.
Identifiers: *Automobile emissions, *Soil organisms.

Cd, Ni, Pb, and Zn in soils and earthworms along two Maryland highways decreased with increasing distance (10, 20, 40, 80, and 160 ft) from the roadway. Metals were quantified by atomic absorption spectrophotometry. Metal residues were higher at the location along each highway where traffic volume was greater. Correlations between residues in earthworms and soil decreased with decreasing atomic weights (Pb > Cd > Zn > Ni). Metal residues in soils were positively correlated with quantities of soil organic matter. Earthworms accumulated up to 331.4 ppm of Pb and 670.0 of Zn, concentrations which may be lethal to earthworm-eating animals. (Jernigan-Vanderbilt)
W74-09780

ZINC AND CADMIUM IN NORMAL HUMAN EMBRYOS AND FETUSES, ANALYSES BY ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Inst. of Rehabilitation Medicine. Univ. Medical Center, N.Y.
S. Chaube, H. Nishimura, and C. A. Swinyard.
Archives of Environmental Health, Vol 26, No 5, p 237-240, May 1973. 2 tab, 46 ref.

Descriptors: *Cadmium, *Zinc, *Laboratory tests, *Human pathology, *Distribution, Toxicity, Industrial wastes, Spectrophotometry, *Pollutant identification.
Identifiers: Atomic absorption spectroscopy.

Zinc and cadmium concentration in 51 intact normal human embryos and fetal organs derived from abortuses ranging in ages from 31 to 261 days of gestation were determined by atomic absorption spectroscopy. The concentrations of zinc and cadmium were studied with reference to age, sex, and stage of development. Specimens studied were 36 first trimester intact human embryos and liver, brain, and kidney of 14 second and 1 third trimester fetuses. Zinc was found in all first trimester specimens. It increased sevenfold between the 31st and 35th day of gestation. Cadmium was present in 57% of specimens in concentrations from 0.032 micro-g/gm to 0.07 micro-g/gm of wet tissue. In second trimester specimens, mean zinc concentration in the brain was 5.6 micrograms, in kidney 15.7 micrograms, and in the liver 167.7 micrograms. Cadmium was present in 80% of livers (mean, 0.113 micro-g/gm), 28% of kidneys (mean, 0.05 micro-g/gm), and 17% of brain specimens (mean, 0.140 micro-g/gm). Mothers of these abortuses did not live in areas of Japan where endemic cadmium poisoning exists; however, higher cadmium content of the average Japanese diet may be reflected by cadmium concentration in these specimens. (Jernigan-Vanderbilt)
W74-09785

NICKEL CARBONYL POISONING, REPORT OF A FATAL CASE,
Pasadena Bayshore Hospital, Tex.
C. C. Jones.
Archives of Environmental Health, Vol 26, No 5, p 245-248, May 1973. 1 tab, 13 ref.

Descriptors: *Nickel, *Toxicity, *Industrial wastes, *Air pollution effects, Inorganic compounds, Public health, Human pathology, *Lethal limit.

Nickel carbonyl (Ni(CO)4) used as a catalyst in the petroleum, plastic, and rubber industries, is by far the most toxic nickel compound encountered in industry, comparable to hydrogen cyanide gas. The maximum permissible concentration of vapor in air (for 8 hours) is 0.001 ppm. In many cases of accidental poisoning nickel carbonyl was not recognized as the offending agent until several days after exposure. Initial and delayed symptoms are described. Fatalities usually occur between the 4th and 11th days after exposure. Death is usually due to pulmonary and cerebral edema. The urine and the lungs are areas where nickel carbonyl is most easily detected. A fatal case of poisoning is described. In the past, various treatments of nickel carbonyl poisoning with edetic acid, dimercaprol (BAL in oil), penicillamine, and more than 20 alkyl dithiocarbamates have been tried. Of these, diethyldithiocarbamate has proven to be effective as well as the least toxic. It is free of the protracted undesirable side effects of either dimercaprol or penicillamine. (Jernigan-Vanderbilt)
W74-09786

GRANULES CONTAINING LEAD IN ISOLATED MITOCHONDRIA,
John Curtin School of Medical Research, Canberra (Australia). Dept. of Experimental Pathology.
J. R. Walton.
Nature, Vol 243, No 5402, p 100-101, May 11, 1973. 1 fig, 9 ref.

Descriptors: *Lead, *Laboratory tests, *Cytological studies, Calcium, Microbiology, Metabolism, Biochemistry, Heavy metals.
Identifiers: *Mitochondria.

Lead is accumulated in granules produced in isolated rat liver mitochondria following incubation in a lead-containing medium. The computed levels of free lead ion in the media ranged from 0.2 micromol to 100 micromol; by comparison, total plasma lead levels of up to 8 micromol have been found in victims of lead poisoning. Mitochondria were isolated with as little disruption as possible. Controls were incubated at 37 C for 30 minutes in calcium-free medium. The experimental samples were incubated in the same medium with the addition of 1 mM lead nitrate and 1.5 mM NTA. When metabolic inhibitors which operate at different points in energy pathways were added to the medium containing lead, granules were smaller and fewer. These results imply that mitochondrial uptake is a process dependent on energy. Further incubation with DNP yielded dispersal of Ca granules while the lead granules seemed to be unaffected, indicating that lead removal is a less readily reversible process. Therefore, if mitochondria accumulate lead in clinical lead poisoning as they do calcium under normal conditions, the subsequent removal of lead from the mitochondria would be physiologically difficult and excessive accumulation of lead cations would disrupt the ability of the cell to maintain itself metabolically and structurally. (Jernigan-Vanderbilt)
W74-09787

OUTBREEDING AND INBREEDING IN A ZINC-LEAD MINE POPULATION OF ARMERIA MARITIMA,
Brussels Univ. (Belgium).
C. Lefebvre.
Nature, Vol 243, No 5402, p 96-97, May 11, 1973. 3 tab, 7 ref.

Descriptors: *Genetics, *Plant breeding, *Zinc, *Lead, Fertility, Pollen, Reproduction, Plant physiology, Aquatic plants.
Identifiers: *Outbreeding, *Inbreeding, *Armeria maritima.

Previous studies have shown that self-fertility occurs in zinc-lead mine populations of normally incompatible plant species. In Armeria self-fertility has been assumed to be a mechanism enabling a reliable production of seeds in colonizing situations where individuals are both few and sparse. Inbreeding was artificially induced by enclosing inflorescences in paper bags. While this method did supply data on potential self-fertility, it did not give any idea about the efficacy of self-fertility in the mine population. Selfing obtained by artificial means can disappear in natural conditions. Through studying outbreeding estimates for a population of Armeria collected from a mine site in Belgium and carrying out progeny tests on three samples of the population to estimate the outbreeding coefficient according to the method of Vasek, there was evidence that inbreeding was not occurring in the population. Oubreeding is concluded to be complete at the present time in the mine population although some potential self-fertility has been shown artificially. (Jernigan-Vanderbilt)
W74-09788

HAND TREMOR INDUCED BY INDUSTRIAL EXPOSURE TO INORGANIC MERCURY,
Rochester Univ., N.Y. Dept. of Psychology.
R. W. Wood, A. B. Weiss, and B. Weiss.
Archives of Environemental Health, Vol 26, No 5, p 249-252, May 1973. 5 fig, 17 ref.

Descriptors: *Mercury, *Public health, *Industrial wastes, Inorganic compounds, Human pathology, Laboratory tests.

Individuals with long term exposure to substantial concentrations of metallic mercury vapor may display a number of symptoms including tremor, hesitancy and slurring of speech, blurred vision, and a central nervous system syndrome termed erethism. This study deals exclusively with hand tremor. Hand tremor induced by industrial exposure to inorganic mercury vapor was studied during recovery in two women patients. The subjects were instructed to maintain a force with the forefinger between two limits (10 to 40 gm). Performance progressively improved after cessation of exposure, and patients were asymptomatic in about 3.5 months. The dispersion of the amplitude distribution decreased and percent time within the specified limits increased. Power spectral analysis revealed a marked reduction in power associated with a change in the shape of the spectra. These changes were associated with a reduction in plasma levels of mercury. Graphs are included to illustrate findings which support the notion of a direct relationship between body burden of mercury and tremor severity. (Jernigan-Vanderbilt)
W74-09789

RELATION OF TRACE METALS TO HUMAN HEALTH,
Dartmouth Coll., Hanover, N.H. Dept. of Physiology.
H. A. Schroeder, and D. K. Darrow.
Environmental Affairs, Vol 2, No 1, p 222-236, Spring 1972. 50 ref.

Descriptors: *Metals, *Public health, *Human pathology, *Rodents, *Toxins, Laboratory tests, Lead, Mercury, Cadmium, Chromium, Beryllium, Reviews, Trace elements.
Identifiers: *Trace metals.

The effects of various trace elements on human health are reviewed in the light of annual industrial consumptions, natural abundances and changes in experimental animals fed low doses for life. A laboratory constructed of wood, covered with plastic varnish, on a remote Vermont hilltop was designed to exclude contaminating metals from air and water. Large numbers of rats and mice were exposed to single elements in low doses for a lifetime. Recondite toxicity was evaluated in terms of growth, life span, longevity, changes in serum tumors, microscopic pathology, disease, reproduction and tissue content of each of the 30 elements fed. Little or no subtle toxicity was shown by several metals. Toxic metals (lead, cadmium, nickel, antimony, beryllium, and mercury) and slightly toxic metals are discussed as to sources and effects. Fourteen metals and two nonmetals are essential for life or health of mammals. (Jernigan-Vanderbilt)
W74-09790

OCCUPATIONAL EXPOSURE TO MERCURY VAPORS AND BIOLOGICAL ACTION,
Louvain Univ. (Belgium). Unite de Toxicologie Industrielle et Medicale.
R. R. Lauwerys, and J. P. Buchet.
Archives of Environmental Health, Vol 27, No 2, p 65-68, August 1973. 5 tab, 24 ref.

Descriptors: *Mercury, *Toxicity, *Public health, *Metabolism, Human pathology, Analytical techniques, Testing procedures, Effects, Industries.
Identifiers: *Threshold limit value, Occupational exposure.

The purpose was to investigate whether biological manifestations could be detected in apparently healthy workers who for a few years ave been moderately exposed to mercury vapors. There is no international agreement yet in regard to the airborne concentration of mercury to which workers can be exposed during their working life without deleterious effect on their health. In the U.S., the threshold limit value (TLV) was recently reduced from 0.100 mg/cu m to 0.050 mg/cu m, while in the U.S.S.R. the permissible concentration of mercury vapor in air is only 0.010 mg/cu m. The following biological changes in workers exposed to airborne metallic mercury were detected: increased blood and urine mercury concentrations, increased plasma galactosidase and plasma catalase activities, decreased red blood cell cholinesterase activity. There is no indication that these slight biological changes have any health significance, however. A significant correlation was found between airborne mercury level and urinary mercury concentration (r=0.47), between mercury concentration in blood and in urine (r=0.36), and between airborne mercury concentration and RBC cholinesterase inhibition (r=0.33). (Jernigan-Vanderbilt)
W74-09793

5D. Waste Treatment Processes

CONCEPTUAL DESIGN EVALUATION OF A PHYSICAL-CHEMICAL DOMESTIC WASTE TREATMENT SYSTEM UTILIZING POWER PLANT WASTE HEAT,
Arizona Univ., Tucson. Dept. of Nuclear Engineering.
R. A. Fazzolare, and R. A. Sierka.
Available from the National Technical Information Service as PB-233 440, $3.00 in paper copy, $1.45 in microfiche. Completion Report, June 1974. 16 p, 6 fig, 5 ref. OWRR A-044-ARIZ(4). 14-31-0001-4003.

Descriptors: *Waste water treatment, *Sewage treatment, *Reclaimed water, *Nuclear power plant, Cooling water, Thermal pollution, Heated water, *Domestic water, *Design.
Identifiers: Heated sewage.

The use of power-plant heat in a physical-chemical domestic wastewater renovation system has been the subject of a three-year investigation in order to explore the feasibility of the concept. In this work conceptual process engineering designs are evaluated and further laboratory experiments are reported. Laboratory tests and preliminary engineering examinations reveal that the commercial exploitation of the concept of combining a wastewater treatment facility to a power plant, using the waste heat to enhance physical-chemical treatment and generating renovated water for condenser cooling, is a viable concept. Pilot plant studies are considered necessary for further engineering evaluations, and a pilot plant design is proposed.
W74-09253

EFFECT OF DETERGENT-LADEN WATER ON THE GROWTH OF CORN,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
For primary bibliographic entry see Field 3C.
W74-09256

APPLICATION OF SEWAGE SLUDGE TO AGRICULTURAL LAND IN MINNESOTA (FINAL ENVIRONMENTAL STATEMENT),
Agricultural Research Service, Washington, D.C.
T. W. Edminster.
Available from the National Technical Information Service, as EIS-MN-73-1813-F, $4.00 in paper copy. (1973). 38 p, 4 fig.

Descriptors: *Sewage sludge, *Water reuse, *Water pollution, *Water pollution control, *Terracing, *Sludge disposal, Non-structural alternatives, Soil conservation, Sludge treatment, Land use, Agriculture, *Minnesota, Project planning, Research and development, Environmental sanitation, Environmental effects, Crop production, Land management, Adoption of practices, Farm management.
Identifiers: *Environmental Impact Statements, Rosemont(Minn.).

A project is proposed to develop a practical and complete system for the handling and use of sewage sludge on agricultural land. The objectives of this proposal were two-fold. The first was to demonstrate safe, efficient and practical methods for the application of sewage sludge to land in harmony with agricultural usage while controlling pollution of surface and ground waters through a program of total water management. The second was to collect information on specific practices for land application of sewage sludge so that safe management guidelines can be developed for various soil, crop, and climatic situations in northern climates. The physical set-up is a 40-acre watershed, which will be level terraced with grassed back slope terraces with surface inlet tile drains. Three alternatives were considered: incineration of the sludge, landfill for its disposal, and various treatment processes. Favorable environmental impacts include development of a conservation system that will reduce sediment loss from the field, and wildlife cover will be provided. Further, such development of sludge uses will yield a favorable economic method of disposal with less adverse pollution effects, and tap a valuable resource now wasted. The adverse effects are minimal and remote, centering around the possibilities of overflow and spillage. (Sutton-Florida)
W74-09265

FINAL ENVIRONMENTAL STATEMENT (OFFICE OF SALINE WATER)--FIVE YEAR EXTENSION RESEARCH AND DEVELOPMENT, PUBLIC LAW 92-60.
Office of Saline Water, Washington, D.C.
For primary bibliographic entry see Field 3A.
W74-09280

GENERAL PLAN FOR RECOMMENDED STORM DRAINAGE FACILITIES, MARION COUNTY, OHIO.
Brown (Floyd G.) and Associates, Ltd., Marion, Ohio.
Available from the National Technical Information Service as PB-221 521, $6.75 in paper copy, $1.45 in microfiche. Final report prepared for the Marion County Regional Planning Commission. May 1973. 62 p, 15 plates, 3 tab, 5 append. Ohio P-299-9.

Descriptors: *Storm drains, *Drainage systems, *Planning, Separated sewers, Storm runoff, Urban drainage, Administration, Project planning, Rational method, Flooding, *Ohio.
Identifiers: *Marion County(Ohio), Scioto River Basin(Ohio), Marion(Ohio), Oleotangy River Basin(Ohio), Sandusky River Basin(Ohio).

Existing storm drainage facilities, anticipated storm drainage needs, and the adequacy of existing systems to meet the projected needs for the year 2000 are examined. The inventory includes information on line locations, sizes, grades and conditions. Maps delineate both existing systems and proposed storm drains. Most of the villages and communities in Marion County have combined systems for carrying the flow of both wastewater and storm drainage. The majority of these are too small to provide adequate drainage during storms. Future land use and service areas in the county must be coordinated to permit an efficient storm drainage system. Projected population growth for the Marion Urban Area for 2000 is 78,000 (45,000 in 1970), incorporated villages 7,115 (5,450 in 1970) and unincorporated areas 89,565 (51,905 in 1970). Density of the Marion Urban Area is expected to remain fairly constant. Slight increases in density may occur in villages and unincorporated areas. Specific recommendations are made for each village. Phased construction is recommended, beginning with those villages with the greatest population and growth potential, with priorities assigned in the recommended storm drainage plan to provide guidance in constructing and financing the necessary improvements. No conclusions are made on the desirability of any of the alternative methods of administration, whether it be on a local, county or watershed basis. Appendixes include a discussion of the Rational Method of estimating storm runoff, design factors for storm drains and an environmental assessment. (Hoffman-North Carolina)
W74-09359

WATER BALANCE IN SEWAGE STABILIZATION LAGOONS,
North Dakota Univ., Grand Forks. Dept. of Civil Engineering.
O. O. Fossum.
Available from the National Technical Information Service as PB-233 482, $3.25 in paper copy, $1.45 in microfiche. Completion Report WI-221-14-72, August 1971. 38 p, 16 fig, 4 tab, 13 ref. OWRR A-009-NDAK(1). 14-31-0001-3234.

Descriptors: *Waste water treatment, Sewage treatment, *Seepage, *Sewage lagoons, Oxidation lagoons, Mass transfer, Evaporation, Groundwater movement, Water quality standards, Water balance, Solid wastes, Chlorides, Phosphates, Sulfates, Fluorides, Water levels.
Identifiers: Groundwater tables.

Site selections and construction details have often ignored seepage beyond the requirements that the lagoon bottom should be a relatively impervious material, such as clay, and no seepage into wells or groundwater supplies should be permitted. Enforcement of Water Quality Standards makes it necessary to retain high water levels in sewage lagoons for longer periods of time than has been done in the past. There have been complaints from adjacent land owners that lagoon seepage was damaging crop land, and damage claims have been filed through legal channels. A value is proposed for the coefficient, N, of .000271 in the mass-transfer equation. Use of this coefficient, the wind speed, and the humidity gradient permits calculation of evaporation. Also proposed is a seepage rate of .0032 feet per day which permits determination of seepage loss. Limitations on their usage are discussed. Evidence is presented showing definite effects on groundwater tables for distance of approximately 400 feet. Conditions which create serious damage to productivity or adjacent land for distances of 300 feet or more are discussed. Effects on groundwater quality as indicated by total solids, chlorides, sulfates, phosphates and fluorides are presented and related to natural and artificial topographic features.
W74-09361

AN EXPERIMENTAL STUDY OF A WASTE-WATER TREATMENT SYSTEM SUITABLE FOR SHIPBOARD USE,
Hydronautics, Inc., Laurel, Md.
C. E. Brown, M. Frommer, J. Ricklis, and A. Gollan.
Available from NTIS, Springfield, Va. 22151, as AD-764 448, Price $3.75 printed copy; $1.45 microfiche. Final Contract Report 734321.4.1 to U.S. Coast Guard, July 1972. 76 p, 29 fig, 9 tab, 6 ref. 734321. DOT-CG-12, 186-A.

Descriptors: *Waste water treatment, *Waste disposal, *Incineration, Sludge disposal, *Membrane processes, Reverse osmosis, Ships, Filtration.

A waste treatment system for ships uses membrane lined tubes for filtration and concentration and a compact pebble bed incinerator for sludge disposal. The incinerator was constructed and tested with satisfactory results burning a digested sludge of 6% solids concentration. Effluent quality and flux were measured for each membrane at several pressures and internal flow speeds. An overall concentration ratio for suspended solids of 130 was reached starting out with a typical raw sewage containing approximately 1000 ppm of total solids. Quality of the effluent was high, containing an average BOD of less than 75 ppm for the best membranes tested. Coliform count was reduced four orders of magnitude with average residuals of less than 1000 per 100 milliliter. (Knapp-USGS)
W74-09373

DISPOSAL OF AIRCRAFT WASHRACK WASTE WATER,
New Mexico Univ., Albuquerque. Eric H. Wang Civil Engineering Research Facility.
B. D. Reinert.
Available from NTIS, Springfield, Va. 22151, as AD-763 095, Price $3.75 printed copy; $1.45 microfiche. Air Force Weapons Laboratory Technical Report AFWL-TR-73-33, June 1973. 36 p, 13 fig, 8 tab, 14 ref.

Descriptors: *Waste water treatment, *Oily water, *Cleaning, Aircraft, Sewage treatment, Facilities, Detergents, *Activated sludge, Coagulation, Centrifugation, Separation techniques, Dilution.
Identifiers: Wash water(Aircraft).

To evaluate methods of treating aircraft washrack waste water, tests included dilution in an activated sludge treatment plant, filtration through a synthetic media filter, and centrifugation using both continuous-flow and batch centrifuges. Activated sludge treatment was suitable at a 6% dilution with domestic sewage. The chemical oxygen demand and emulsified oil concentrations at this dilution were 1000 and 200 mg/liter, respectively. Coagulation of washrack waste water with alum, followed by filtration, was not economical because of the excessive chemical additions required. Centrifugation of washrack waste water was not feasible because oil removal was negligible even at relative centrifugal forces as high as 20,000. (Knapp-USGS)
W74-09376

TREATMENT OF ELECTROPLATING WASTES BY ION EXCHANGE,
New Mexico Univ., Albuquerque. Eric H. Wang Civil Engineering Research Facility.
R. B. Lehmann.
Available from NTIS, Springfield, Va. 22151, as AD-767 229, Price $3.00 printed copy; $1.45 microfiche. Air Force Weapons Laboratory Technical Report AFWL-TR-73-124, August 1973. 33 p, 6 fig, 8 tab, 8 ref. Contract F29601-72-C-0024.

Descriptors: *Ion exchange, *Anion exchange, *Waste water treatment, *Heavy metals, Recycling, Waste reuse, Nickel, Copper, Cadmium, Zinc, *Industrial wastes.
Identifiers: *Cyanide, *Electroplating wastes.

Strong anion resins (Dowex MSA-1, Amberlite IRA-938, Duolite A-102D) and mixed bed systems (Dowex MSA-1 and MSC-1, Amberlite IRA-938 and IR-120 plus, Duolite A-102D and C-20) were tested in an attempt to find a satisfactory ion exchange system for the removal of cyanide and heavy metals (Ni, Cu, Cd, Zn) from dilute electroplating wastes. The strong anion resins remove both the cyanide and the metal as an anionic complex species. While the removal produces acceptable effluent for disposal into public sewage systems, the capacity of the resin decreases with successive regenerations. In some resin systems this decrease in capacity was as high as 56%. In addition, the regeneration liquids contain anionic complex metal cyanides which are unsuitable for recycling and require further treatment. (Knapp-USGS)
W74-09377

THE USE OF OCEAN OUTFALLS FOR MARINE WASTE DISPOSAL IN SOUTHEAST FLORIDA'S COASTAL WATERS,
Miami Univ., Fla. Sea Grant Institutional Program.
T. N. Lee, and J. B. McGuire.
Available from NTIS, Springfield, Va. 22151 as COM-73-10925 Price $3.00 printed copy; $1.45 microfiche. Coastal Zone Management Bulletin Series No 2, January 1973. 19 p, 5 fig, 4 ref. NOAA SG 2-35147.

Descriptors: *Waste water disposal, *Florida, *Outlets, *Outfall sewers, *Water pollution control, Water pollution sources, Sewage treatment, *Waste water treatment.

The ocean outfall method of sewage disposal as presently practiced in South Florida is unsafe and a detriment to the ecology and aesthetics of the area. Options for the improvement of the system are proposed. These are: extend all of the existing outfall lines to a depth of 300 to 400 feet; install diffusers to improve the mixing and initial dilution of the effluent; and provide secondary treatment with a high level of chlorination. Attempts should continue to find methods to remove viruses. (Knapp-USGS)
W74-09403

TREATMENT OF WASTEWATERS FROM MILITARY FIELD LAUNDRY, SHOWERS, AND KITCHEN UNITS,
Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
D. S. Lent, and R. G. Ross.
Available from NTIS, Springfield, Va. 22151 as AD-765 483 Price $3.50 printed copy; $1.45 microfiche. Report 2061, May 1973. 53 p, 15 tab, 2 append. IG 66 2708 DJ 39-10.

Descriptors: *Waste water treatment, *Military reservations, *Activated carbon, Electrolytes, *Polyelectrolytes, Water reuse.

A wastewater treatment process utilizing powdered activated carbon, a cationic polyelectrolyte and a modified standard Army water purification unit was evaluated for wastewaters from field mili-

tary showers, laundries, kitchen units, and a laundromat. A modified standard Army water purification unit (ERDLator) can be utilized effectively for treating wastewater generated in field operations. A high quality water is produced when treating shower and blended wastewaters. Blending the kitchen and laundry waters with shower water reduces or eliminates the problems encountered when treating the waters separately. Carbon sludge can be reused as a supplement to fresh carbon for treating the wastewater. The carbon sludge produced is easily dewatered, and the volume of sludge generated minimizes the sludge disposal problem. (Knapp-USGS)
W74-09410

PROCEEDINGS-WORKSHOP ON LAND DISPOSAL OF WASTEWATERS.
North Carolina State Univ., Raleigh. Water Resources Research Inst.
Available from the National Technical Information Service as PB-233 403 $4.50 in paper copy, $1.45 in microfiche. Report No 91, UNC-WRRI-73-91, (1973). 112p, (edited by James M. Stewart). Conference held in Raleigh, N.C., November 20, 1973. OWRR A-999-NC (39), 14-31-0001-3833.

Descriptors: *Land disposal, Ultimate disposal, Waste treatment, *Waste water treatment, *Irrigation, Recycling, Waste water disposal, Soil disposal fields, Water reuse, Economics, *Return flow.

Eight papers summarize the state of the art including United States and foreign operating experience, regulatory practices, geographical distribution and location of existing land disposal facilities, irrigation practices, land and soil management practices, interaction with soils, health aspects, aerosols, economics of land disposal of and irrigation with wastewaters, and land disposal treatment systems and criteria for animal, agricultural, and municipal wastes. (See also W73-09423 thru W74-09430) (McJunkin-North Carolina State)
W74-09422

LAND APPLICATION OF WASTEWATER,
Environmental Protection Agency, Washington D.C. Div. of Municipal Waste Water Programs.
B. L. Seabrook.
In: Proceedings of Workshop on Land Disposal of Wastewaters, November 20, 1973, Raleigh, N.C.: North Carolina University Water Resources Research Institute Report No 91, p 1-35, 1973. 1 fig.

Descriptors: *Waste water disposal, *Irrigation, Sprinkler irrigation, Water spreading, Waste water treatment, Sewage treatment, *Water reuse.
Identifiers: *Land disposal(Wastes).

A field survey was made of approximately 100 facilities in all climatic zones where community or industrial wastewaters are being applied to the land. Another survey was carried out to ascertain the nature and extent of State health and water pollution control regulations governing the use and control and land application systems. Land application of effluent is employed to provide supplemental irrigation water, to give economical alternative solutions for treating wastes and discharging them without causing degradation of rivers, lakes and coastal waters, and to overcome the lack of suitable receiving waters and eliminate excessive costs of long outfall lines to reach suitable points of disposal into large surface bodies of water. Although facilities of all types were surveyed, this report is primarily concerned with irrigation-type facilities for supplying supplemental water to crop areas, forest areas and unharvested soil cover acreages. Spray irrigation is the most frequently used (57 facilities) method of application, although most municipalities use more than one method. Ridge-and-furrow irrigation is used at 23 facilities and flooding irrigation by 34 systems. Industry generally uses spray irrigation. (See also W74-09422) (Knapp-USGS)
W74-09423

MANAGEMENT OF LANDS USED FOR WASTE DISPOSAL,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
J. A. Phillips.
In: Proceedings of Workshop on Land Disposal of Wastewater, November 20, 1973, Raleigh, N.C.: North Carolina University Water Resources Research Institute Report No 91, p 37-41, 1973.

Descriptors: *Waste disposal, *Land management, *Waste water disposal, Landfills, Water spreading, Waste water treatment, Waste treatment.
Identifiers: *Land disposal(Wastes).

In order to manage land for waste disposal, a knowledge of the soil and its physical and chemical characteristics that occur in the waste field must be obtained. Soil physical properties that are of importance are soil depth, infiltration rates, texture, structure, types of clay, permeability, and porosity. Regardless of the use that is made of the land, care must be taken to prevent any waste or waste water from reaching the surface water or groundwater in order not to violate water quality standards. If the land is to be used for waste disposal solely or is dedicated for the disposal of waste only, the main criterion is the protection of the environmental quality. However, if crop production is to be coupled with the waste disposal, the amount that is to be applied to any particular crop would be determined by the current fertility levels of the soil and the fertility needs of the crop itself. (See also W74-09422) (Knapp-USGS)
W74-09424

WASTEWATER AND SOIL INTERACTION,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
B. L. Carlile.
In: Proceedings of Workshop on Land Disposal of Wastewaters, November 20, 1973, Raleigh, N.C.: North Carolina University Water Resources Research Institute Report No 91, p 43-47, 1973.

Descriptors: *Waste disposal, *Land management, *Waste water disposal, Landfills, Water spreading, Waste water treatment, Waste treatment.
Identifiers: *Land disposal(Wastes).

The application of any wastes on land may be considered a recycling process for the essential nutrients and biodegradable organics but only a disposal repository for all other nonessential and nondegradable components. Loading factors to be considered in the design and successful operation of a land treatment system are hydraulic loading, nutrient loading, organic loading, salt loading, and toxic elements. Good soil and water conservation practices are needed to prevent direct runoff of wastewater from the land to insure the percolation of the water through 4 or 5 feet of unsaturated soil which should remove pathogenic organisms. (See also W74-09422) (Knapp-USGS)
W74-09425

HEALTH ASPECTS OF LAND APPLICATION OF WASTEWATER AT MILITARY INSTALLATIONS,
Army Medical Research and Development Command, Washington, D.C. Sanitary Engineering Research Branch.
J. P. Glennon.
In: Proceedings of Workshop on Land Disposal of Wastewaters, November 20, 1973, Raleigh, N. C.: North Carolina University Water Resources Research Institute Report No 91, p 49-67, 1973. 6 ref.

Descriptors: *Waste water disposal, *Irrigation, *Public health, Military reservations, Sprinkler irrigation, Sewage treatment, Waste water treatment.
Identifiers: *Land disposal(Wastes).

The Army's program in the health effects of land disposal of wastewater includes studies on heavy metals, pesticides, biological aerosols, and microbial soil and groundwater contamination. Techniques are available for monitoring heavy metals and pesticide residues at land disposal sites. Waste-water disinfection and buffer zones bordering spray sites insure that land disposal of wastewater has no adverse impact on the environment. (See also W74-09422) (Knapp-USGS)
W74-09426

ECONOMICS OF ALTERNATIVE WASTE-WATER TREATMENT SYSTEMS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
M. R. Overcash.
In: Proceedings of Workshop on Land Disposal o Wastewaters, November 20, 1973, Raleigh, N.C. North Carolina University Water Resource Research Institute Report No 91, p 69-74, 1973. fig, 2 tab.

Descriptors: *Waste water treatment, *Sewag treatment, Tertiary treatment, Nitrogen Phosphorus, Waste water disposal, Installatio costs, Operating costs, Economics.
Identifiers: *Land disposal(Wastes).

Secondary treatment costs 30 to 32 cents pe thousand gallons. Phosphorus and nitroge removal add 25 to almost 60 cents per thousan gallons in addition to secondary treatmen Economic differences between land disposal ar secondary treatment are important, particularly federal requirements go beyond secondary trea ment. (See also W74-09422) (Knapp-USGS)
W74-09427

IRRIGATION COST FOR LAND DISPOSAL,
North Carolina State Univ., Raleigh. Dept. Biological and Agricultural Engineering.
R. E. Sneed.

Descriptors: *Waste water disposal, *Economic *Sprinkler irrigation, Installation costs, Operati costs, Tertiary treatment, Cost-benefit analysis.
Identifiers: *Land disposal(Wastes).

Any type of irrigation system for land disposal waste should be a complete system. The desig must know the soil characteristics, the compo tion and strength of the wastes, and the amount wastes to be applied. The irrigation system sho be designed to meet all these criteria; it should b complete system capable of handling the wastes a safe and economical manner. For land dispos automated systems are most satisfactory and easiest system to automate is probably a p manent sprinkler system. Initial cost is ab $1,400 per acre. Operational cost is about $0.10 1000 gallons based on a 1,000,000 gallon-per-d plant. (See also W74-09422) (Knapp-USGS)
W74-09428

COSTS AND RETURNS OF LAND SPREADI WASTWATER,
North Carolina State Univ., Raleigh. Dept. Economics.
G. A. Carlson.
In: Proceedings of Workshop on Land Disposa Wastewaters, November 20, 1973, Raleigh, N North Caina University Water Resource Research Institute Report 91, p 81-89, 1973. 1 fi tab.

Descriptors: *Waste water disposal, Econom *Sprinkler irrigation, Installation co *Operating costs, Tertiary treatment, Cost-ben analysis.

Identifiers: *Land disposal(Wastes).

Substitution of land spreading for other forms of advanced waste treatment is a viable alternative that many cities and towns are now considering. Some of the factors affecting net land spreading costs are reviewed. The effect of minimum barrier distance requirements on land costs, the expected increased return to receiving sites when irrigated, and storage costs are discussed. (See also W74-09422) (Knapp-USGS)
W74-09429

TREATMENT SYSTEMS FOR ANIMAL, AGRICULTURAL AND MUNICIPAL WASTES,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
F. J. Humenik.
In: Proceedings of Workshop on Land Disposal of Wastewaters, November 20, 1973, Raleigh, N.C.: North Carolina University Water Resources Research Institute Report 91, p 91-103, 1973. 1 fig, 5 tab.

Descriptors: *Waste water treatment, *Waste water disposal, *Farm wastes, *Municipal wastes, *Irrigation, Nutrients, Sewage treatment, Anaerobic digestion, Lagoons.
Identifiers: *Land disposal(Wastes).

Many of the simple systems developed for the pretreatment and terminal disposal of agricultural waste on land can be applied to municipal waste and in particular are very feasible for the treatment of rural domestic waste. Unaerated ponds can provide significant pretreatment at a very low cost. The treatment efficiency of ponds can be increased by utilizing series systems and providing aeration in the first unit. Pond systems can also be managed to facilitate nitrification-dentrification when aeration is employed in the first unit, and the second unit is maintained anaerobic by direct raw waste inputs. Pond systems must be considered as pretreatment devices prior to land irrigation of excess liquid. Land irrigation is limited either by the hydraulic or process load. The gigher degree of treatment provided or the lower the concentration of nitrogen, the less value the excess water has for fertilization and the more controlling hydraulic loading becomes. Current recommended loading rates are to apply no more nitrogen than fertilizer recommendations for a particular vegetative cover. Therefore, the most economic approach is to balance both the hydraulic and process load so that the application limit for both liquid and nitrogen closely interrelate for each waste stream. (See also W74-09422) (Knapp-USGS)
W74-09430

STABILITY AND CONTROL OF ANAEROBIC DIGESTION,
Metropolitan Sanitary District of Greater Chicago, Ill.
L. P. Graef, and J. F. Andrews.
Journal Water Pollution Control Federation, Vol 46, No 4, p 666-683, April 1974. 14 fig, 24 ref.

Descriptors: *Sludge digestion, *Anaerobic digestion, Control, *Waste treatment, *Computer studies, *Model studies, Organic loading, Toxins, Design standards, Operation and maintenance, Sludge treatment, Methane, Sludge, Alkalinity, Carbon dioxide, Digestion, Control systems.
Identifiers: *Overloads, Hydrocarbons, Control strategies, Stability, Process control.

The dynamic response of the anaerobic digester to organic, toxic, and hydraulic overloading was simulated with a hybrid computer to evaluate process stability indicators, design and operation factors influencing process stability, and control strategies. The rate of methane production was one of the best indicators for detecting impending failure caused by toxic compounds. Improved process stability with respect to organic overloading can be achieved by increasing the residence time, alkalinity, influent sludge concentration, and digested sludge recycle. Three control strategies (scrubbing of carbon dioxide from the gas phase with subsequent gas recycle, addition of a base, and digested sludge recycle) were investigated. Consideration of process stability and implementation of control strategies could improve digester operation, permit increased loadings on existing digesters, and decrease the required volumes of new digesters. (Witt-IPC)
W74-09434

KINETICS OF ACTIVATED SLUDGE OXYGENATION,
Texas Univ., Austin. Dept. of Civil Engineering.
M. J. Humenick, and J. E. Ball.
Journal Water Pollution Control Federation, Vol 46, No 4, p 735-747, April 1974. 10 fig, 2 tab, 31 ref.

Descriptors: *Activated sludge, *Aeration, *Oxygenation, *Kinetics, *Sludge digestion, Settling velocity, Sludge, Dissolved oxygen, *Waste water treatment, Oxygen, Laboratory tests, Odor, Waste treatment, Benefits, Oxygen demand, Biological treatment.

A laboratory-scale activated sludge reactor was used to determine the effect on sludge settleability, kinetics, and sludge production of using pure oxygen versus air in the aeration stage. No significant differences were found in the sludge yield coefficient, decay coefficient, or substrate removal kinetics, whether using air or oxygen. Neither were there any significant differences in the initial settling velocity of activated sludge in the zone settling region. The initial settling velocity was found to be a function of the mean cell retention time and the intensity of previous mixing. Although the kinetic and growth characteristics of activated sludge developed under oxygenation seem to be the same as under aeration, several inherent advantages may be realized by the use of high-purity oxygen. Benefits may include the ability to supply high oxygen demand at the influent end of a reactor, odor control advantages of a closed system, significant dissolved oxygen concentrations in the plant effluent, efficient oxygen transfer at low mixing velocities, reduced reactor size, higher possible food-to-microorganism ratios, less net sludge production, and reduced size of sludge-processing equipment. (Witt-IPC)
W74-09437

THERMAL SLUDGE CONDITIONING IN KALAMAZOO, MICHIGAN,
Kalamazoo Dept. of Public Works, Mich.
D. H. Swets, L. Pratt, and C. C. Metcalf.
Journal Water Pollution Control Federation, Vol 46, No 3, p 575-581, March 1974. 5 fig, 5 tab.

Descriptors: *Sludge treatment, Heat treatment, Treatment facilities, *Dewatering, *Incineration, *Municipal wastes, Operating costs, Operations, Operation and maintenance, *Michigan.
Identifiers: *Kalamazoo(Mich), *Thermal conditioning, Sludge conditioning, Vacuum filtration, Thickeners.

The city of Kalamazoo, Michigan, operates a thermal sludge conditioning system to treat sludge from its waste water treatment plant. Sludge from the existing thickeners is treated in three conditioning units, each having a capacity of 32.5 tons (29.5 metric tons) of dry solids/day. Each unit is designed to operate at 25% above the normal 400 psi (28 kg/sq cm) pressure and consists of a sludge grinder; centrifugal feed pump; positive-displacement, diaphragm-exchange, high-pressure sludge pump; heat exchangers; reactor; steam generator; gas-liquid separator; and pressure control valves. The sterile treated sludge is thickened in two 70 ft. (21.3 m) diameter thickeners with rotating rake mechanism and dewatered on three vacuum filters without the use of chemical flocculants. The dried sludge is incinerated. Process vapors from the sludge thickening tanks are discharged into the incinerators as combustion air. The operating characteristics of the thermal conditioning plant and associated operational problems are discussed. The operating cost/ton of sludge processed (excluding operating and maintenance labor) is given. (Witt-IPC)
W74-09439

KINETICS OF SUBSTRATE ASSIMILATION AND PRODUCT FORMATION IN ANAEROBIC DIGESTION,
Institute of Gas Technology, Chicago, Ill. Div. of Bioengineering Research.
For primary bibliographic entry see Field 5B.
W74-09440

DEWATERING DIGESTED PRIMARY SLUDGE,
Los Angeles County Sanitation District, Calif.
J. D. Parkhurst, R. P. Miele, S. T. Hayashi, and F. F. Rodrigue.
Journal Water Pollution Control Federation, Vol 46, No 3, p 468-484, March 1974. 12 fig, 6 tab.

Descriptors: *Sludge treatment, *Dewatering, *Centrifugation, *Operating costs, *Pilot plants, Costs, Economics, Solid wastes, Polymers, Anaerobic digestion, Sludge, Solid wastes, Separation techniques, Treatment facilities, Additives, *California, Sludge digestion.
Identifiers: *Los Angeles County(California).

A sludge dewatering research project was conducted at the Joint Water Pollution Control Plant of the County Sanitation Districts of Los Angeles County (California) to find a system capable of recovering at least 95% solids from anaerobically digested primary sludge. Fourteen months of pilot plant studies revealed that five conditioning-dewatering schemes were capable of satisfying the requirement. Based on performance and economic factors, a two-stage centrifugation system using horizontal scroll centrifuges followed by basket centrifuges was selected. Cationic polymer was used to condition the basket centrifuge feed. The unit cost for dewatering 300 dry tons/day (272,100 kg/day) was estimated to be $29/ton ($0.032/kg). (Witt-IPC)
W74-09441

REUSE AND RECYCLE OF WATER IN INDUSTRY,
Bostock Hill and Rigby, Birmingham (England).
C. J. Appleyard, and M. G. Shaw.
Chemistry and Industry, No 6, p 240-246, March 16, 1974. 2 tab, 10 ref.

Descriptors: *Water reuse, *Recirculated water, *Industrial water, *Waste water reclamation, *Waste water treatment, *Recycling, *Impaired water use, *Reclaimed water, *Water conservation, Chemical industry, Food processing industry, Electronics, Steel, Metallurgy, Mining, Water pollution control, Chemcontrol, Economics, Cost-benefit analysis, Regulation, Legal aspects.

The status and prospects of water reuse in various industries are reviewed, including case histories from the food, electronic, and steel industries. Treatment techniques prior to water recycling are surveyed. Motivation for increased recycling will come from stricter water quality standards, diminishing availability of resources, and greater cost of clean water. The first consideration by industry will remain direct savings accruing from minimized freshwater intake and process losses. Direct reuse of sewage effluent as industrial or second-class water requires further study, particularly in heavily industrialized areas with short transport distances. Present technology seems already adequate, and future trends may lie in chemical-physical treatments combining several high-rate processes to provide better than expected economies. (Brown-IPC)
W74-09444

INPLANT PH CONTROL PERMITS OPTIMUM AERATION EFFICIENCY,
Weyerhaeuser Co., Everett, Wash.
F. B. Howard.
Pulp and Paper, Vol 47, No 13, p 108-111, Dec., 1973. 3 fig, 1 tab.

Descriptors: *Waste water treatment, *Hydrogen ion concentration, *Aeration, *Pulp wastes, *Bleaching wastes, Mixing, Control systems, Control, Pulp and paper industry, *Washington, Alkalinity, Acidity, Lime, Calcium carbonate, Biochemical oxygen demand, Biological treatment.
Identifiers: Kraft mills, Chemical recovery, pH control, Black liquors, Spent pulping liquors, *Everett(Wash).

Difficulties in meeting BOD reduction requirements led to installation of a secondary aeration process at Weyerhaeuser Co.'s kraft mill in Everett, Washington. The pH of combined mill effluents from the primary treatment varied from 2 to 12, much too widely for effective secondary treatment for which pH 6-8 is the best range. The proper sequencing of combining separate effluents was found to be the key to total effluent pH control. Particularly, by combining the acid bleach plant waste with the alkaline stream from the chemical recovery plant which contains calcium carbonate and hydroxide, the total effluent's pH was brought within the desired range most of the time. Occasionally, an additional amount of lime had to be added. (Hansen-IPC)
W74-09445

TREATMENT AND DISPOSAL OF CHEMICAL PHOSPHATE SLUDGE IN ONTARIO,
Ontario Ministry of the Environment, Toronto.
G. L. Van Fleet, J. R. Barr, and A. J. Harris.
Journal Water Pollution Control Federation, Vol 46, No 3, p 582-587, March 1974. 14 ref.

Descriptors: *Phosphorus compounds, *Canada, *Waste water treatment, *Municipal wastes, Chemical wastes, International Joint Commission, Laboratory tests, On-site tests, Treatment facilities, Programs, Project planning, Pollution abatement, Lakes, Great Lakes.
Identifiers: *Ontario(Phosphorus discharge control).

Ontario is involved in a 5-year program to control, by 1975, phosphorus discharges from more than 200 existing municipal waste water treatment plants serving a population of 4.7 million. Phosphorus removal facilities must be installed and operational in 75% of these plants by the end of 1973. The program is a response to International Joint Commission recommendations on the Lower Great Lakes and the demonstrated need for nutrient controls in prime recreational waters throughout Ontario. Existing waste treatment ranges from lagoons to activated sludge and tertiary treatment processes, with plant capacities up to 180 million gallons/day. The integration of chemical treatment into these processes has required a broad program of research that, to date, has involved laboratory and full-scale investigations at more than 60 plants. (Witt-IPC)
W74-09447

CLEANING PAPER INDUSTRY EFFLUENTS BY MEANS OF ACTIVATED CARBON (UEBER DIE REINIGUNG PAPIERINDUSTRIELLER RESTABWAESSER MITTELS AKTIVKOHLE),
Technische Universitaet, Darmstadt (West Germany). Wasser- und Abwasserforschungsstelle.
W. Brecht, and H-L. Dalpke.
Wochenblatt fuer Papierfabrikation, Vol 101, No 14, p 501-513, July 31, 1973. 11 fig, 8 tab, 24 ref. English summary.

Descriptors: *Waste water treatment, *Pulp wastes, *Activated carbon, *Biological treatment, *Comparative costs, *Comparative benefits, Effluents, Biochemical oxygen demand, Color, Chemical oxygen demand, Costs, Operating costs, Organic loading, Foreign research, Europe, Particle size.

Granular activated carbon, which can be regenerated, was found suitable for the practical adsorption of BOD loadings from pulp and paper mill effluents. The theory and practice of this process are discussed. Experiments indicate that the carbon particles should not be too fine, that the effluent load should not exceed 100 mg of 5-day BOD/liter, and that frequent backwashing of the adsorbent should be performed. Under these conditions, the process can replace biological purification. Complete color removal and increased COD reduction are its main advantages, albeit at somewhat higher costs than for biological treatment. The possibility of combining bio-purification with activated C treatment is recommended for study. (Speckhard-IPC)
W74-09450

AVAILABLE AIR MEASUREMENTS APPLIED TO FLOTATION THICKENER EVALUATIONS,
CH2M/Hill, Inc., Corvallis, Oreg.
K. V. Leininger, and D. J. Wall.
Deeds and Data (Water Pollution Control Federation), p D1, D4-D8, May, 1974. 6 fig, 1 tab, 9 ref.

Descriptors: *Treatment facilities, Equipment, *Flotation, *Sludge treatment, *Dewatering, *Air entrainment, *Air demand, Pressure, Saturation, Dissolved oxygen, Sampling, Water sampling, Mathematical studies, Operation and maintenance, Flow, Suspended solids, Sludge digestion.
Identifiers: *Thickeners(Dewatering filters), Calculations(Computations), Clarifiers.

Studies of flotation thickeners seldom give proper estimates of the air volume actually available for flotation of sludge. Conventional calculations of air balance in a pressurized saturation system do not verify that all the air is actually being dissolved, nor do they provide direct measures of the air available for flotation. A new sampling method is presented which does determine this air volume. It measures the air released from solution upon depressurization of a highly saturated flow as it leaves a pressurized dissolved-air system. Example calculations are presented for the percent saturation efficiency of a pressurized system and for the air:liquid ratio of the pressurized flow to a flotation process. The calculated available air supply rate can be divided by a known or desired solids loading rate to determine the available air:solids ratio for any particular application, which is one of the most important factors in flotation thickening. (Brown-IPC)
W74-09451

OXIDATION AND AERATED LAGOON OPERATION,
Safford Municipal Utilities, Ariz.
E. R. Etter.
Deeds and Data (Water Pollution Control Federation), p D2-D3, May, 1974.

Descriptors: *Lagoons, *Aerated lagoons, *Operation and maintenance, *Waste water treatment, *Monitoring, *Water quality control, Sodium compounds, Nitrates, Algae, Color, Odor, Hydrogen ion concentration, Dissolved oxygen, Weed control, Temperature, Weather patterns, Optimization, Pondweeds.

The prime responsibility of a pond operator is to monitor and aid natural processes of waste treatment by providing an optimum environment. He should watch for signs of pond imbalance (water color, floating surface matter, odor evolution, and conditions of banks) and of septicity. He should keep records of dissolved oxygen, pH, relative stability, temperature, and weather conditions; remove weeds from the water; and have sodium nitrate available to prevent algal dieoff. (Brown-IPC)
W74-09452

STUDIES ON INTERNAL REUSE OF SULFITE EVAPORATOR CONDENSATES (UNTERSUCHUNGEN ZUR INNERBETRIEBLICHEN WIEDERVERWENDING VON SULFITABLAUGENEINDAMPFKONDENSATEN),
Institut fuer Zellstoff und Papier, Heidenau (East Germany).
B. Bach, G. Fiehn, and H. Schmidt.
Zellstoff and Papier, Vol 22, No 12, p 355-363, Dec 1973. 3 fig, 13 tab, 18 ref.

Descriptors: *Water reuse, *Impaired water use, *Sulfite liquors, *Pulp wastes, *Recirculated water, Condensation, Evaporation, *Water conservation, Industrial water, Pulp and paper industry, Pollution abatement, Water pollution control, Recycling, Biochemical oxygen demand, Chemical oxygen demand, Ion exchange, Anion exchange, Effluents, Water pollution sources.
Identifiers: *Evaporator condensates, Spent sulfite liquors, Sulfite pulp mills, Bleach plants, Pulp washing, Wash water.

A study of the composition and properties of spent sulfite liquor evaporation condensates indicated severe increases in BOD and COD of sulfite pulp mill effluents loaded with such condensates. In many Scandinavian sulfite mills, these condensates are, therefore, recycled either to the cooking liquor preparation or to the pulp washing stage, despite some ensuing operating problems. Two possibilities for internal reuse are proposed: (1) Untreated condensates might be reused in the bleach plant. (2) Partial purification by anion exchange would reduce the BOD by 50-60% and the COD by 70-75%, so that the treated condensates could be used in lieu of fresh water for pulping and pulp washing without adverse effects on pulp quality. (Ward-IPC)
W74-09453

PULP MILL WASTE WATERS: DISCHARGE AND PURIFICATION (ZELLSTOFFABWAESSER: ANFALL AND REINIGUNG),
Technische Hochschule, Vienna. (Austria). Institut fuer Wasserversorgung Abwasserreinigung und Gewasserschuts.
W. V. D. Emde, H. Fleckseder, L. Huber, and K. Viehl.
Wiener Mitteilungen Wasser, Abwasser, Gewaesser, Vol 13, June, 1973, 420 p. 69 fig, 8 tab, 1 map, 130 ref, append.

Descriptors: Waste water(Pollution), *Discharge(Water), *Water purification, Pulp and paper industry, Pollution abatement, Europe, *Pulp wastes, Water pollution control, *Air pollution, *Waste water treatment, *Water reuse, *Water conservation, Sulfite liquors, Wood wastes, Effluents, Water pollution sources.
Identifiers: *Austria, Kraft mills, Sulfite pulp mills.

A study was commissioned by the Austrian Department of Agriculture and Forestry to survey the extent of water pollution by pulp and paper mills and to recommend practical countermeasures. In chapters and an appendix (excerpted from Fleckseder's doctoral dissertation), the volume outlines the following topics: The technological and economic development and status of the Austrian (and some foreign) pulp and paper industries with emphasis on environmental impacts. The chemistry of wood and the technology of pulp manufacture. In-plant measures for water recirculation and conservation, spent liquor disposal, and by-product recovery. External effluent-treatment processes and facilities, including solids removal, flocculation, chemical coagulation, the Elektro-K process, screening, filtration, sedimentatio

flotation, BOD removal, aerobic-anaerobic aerated and nonaerated ponds and lagoons, activated sludge processes, trickling filters, color removal, adsorption, reverse osmosis, sludge handling and disposal, fines recovery from white waters and barking wastes, and the like. Air pollution and its control. Costs of antipollution installations for sulfite and kraft pulp and paper mills. Finally, recommendations are presented in general and specific terms for new and old sulfite mills and for existing kraft mills in the interest of pollution abatement. A selective bibliography of pertinent literature citations is appended. (Brown-IPC)
W74-09455

ULTRAFILTRATION SETS SAIL FOR NEW PROCESS SERVICES.
Chemical Engineering, Vol 81, No 4, p 88-89, Feb 18, 1974. 2 fig.

Descriptors: *Membrane processes, *Waste water treatment, *Filtration, *Reverse osmosis, Treatment facilities, *Equipment, Effluents, Pulp wastes, Chemical wastes, Chemical industry, Pulp and paper industry, Textiles, Paints, Metals, Detergents, Industrial wastes.
Identifiers: *Ultrafiltration, Ucarsep ultrafiltration system.

The 'Ucarsep' ultrafiltration system developed by Union Carbide Corp. can treat highly corrosive, solvating, and abrasive solutions at all practical liquid temperatures (up to 200 F) and pH values (2-14). The equipment uses porous carbon tubes as supports which are coated on their internal surfaces with separation membranes made of any one of several proprietary (not disclosed) inorganic compounds that are matched to the respective end-use requirements. A typical unit rated at a capacity of 2000 to 5000 gal/day comprises 151 tubes 48 inch long with 0.25 inch inside diameter, all housed in a shell of 6 inch diameter. At 100 psi pressure, its permeation rate exceeds 100 gal/sq ft/day. Typical applications of Ucarsep units include removal of oil and dirt from hot alkaline detergent solutions used for metal cleaning prior to painting, recovery and concentration of paint pigments from electroplating rinse waters, removal of textile size from aqueous effluents, and clear water recovery from black liquors and other pulp and paper mill effluents. (Witt-IPC)
W74-09456

STUDIES ON RENOVATION OF PULP MILL WASTE WATER: PILOT-PLANT TESTS FOR GRANULAR ACTIVATED CARBON ADSORPTION OF KRAFT PULP MILL WASTEWATER (IN JAPANESE),
Government Industrial Research Inst., Shikoku (Japan).
For primary bibliographic entry see Field 5B.
W74-09457

Descriptors: *Waste water treatment, *Pulp wastes, *Lignins, *Adsorption, *Activated carbon, *Chemical oxygen demand, Bleaching wastes, Lime, *Pilot plants, Industrial wastes, Foreign research, Waste treatment, Pulp and paper industry, Operating costs, Efficiencies, Consumptive use, Flow rate.
Identifiers: Chemical consumption, Alkaline extraction, *Japan, Kraft pulp, Kraft mills, Bleach plants.

Pilot-plant adsorption columns of activated carbon granules were used to remove lignin from a lime-pretreated brown stock (unbleached kraft pulp) wash water (containing 12-26 ppm of lignin and 25-30 ppm of COD) and from an activated sludge-treated and subsequently lime-treated kraft bleach plant (alkaline extraction) effleunt (containing 33-40 ppm of lignin). Adsorption isotherms and chemical consumptions were measured. At a surface flow rate of 1.7 m/hr and a contact time of 140 min, 1 kg of dry carbon sufficed to treat 3530 liters (based on lignin removals) or 3090 liters (based on COD removals) of lime-pretreated effluent, compared to 310 liters (lignin basis) or 3670 liters (COD basis) of a non-pretreated dilute wash water which contained as much lignin as did the limed effluent. These results indicate that lime pretreatment improves the absorption of lignin on activated carbon, but has little effect on COD removal. For lignin removal from alkaline extraction (bleaching) effluent, 1 kg of dry carbon was consumed in treating a relatively small volume (130 liters only). This lower efficiency is attributed to the higher lignin concentration of the bleach plant effluent. (Brown-IPC)
W74-09457

CLEANING UP: PAPER INDUSTRY'S MESS,
For primary bibliographic entry see Field 5G.
W74-09458

INROADS TO ACTIVATED CARBON TREATMENT,
L. C. Gibney.
Environmental Science and Technology, Vol 8, No 1, p 14-15, Jan, 1974. 2 fig, 2 tab.

Descriptors: *Waste water treatment, Industrial wastes, *Pulp wastes, *Organic loading, *Phenols, *Color, *Activated carbon, *Sewage treatment, Effluents, Adsorption, Toxicity, Molecular structure, Organic compounds, Alcohols, Acids, Polarity, Costs, Operating costs.
Identifiers: Molecular weight.

The activated carbon treatment of waste waters for removal of organic compounds offers several advantages over other effluent treatment processes, notably low land requirements, low sensitivity to fluctuations in pollution loadings, high removal rates, immunity against toxic wastes, flexibility in design and operation of treatment facilities, and reactivation and reuse capacities. Cost estimates are given for an expanded-bed, two-stage absorption installation for treating 10 million daily gallons of clarified raw sewage. Extensive laboratory data on the removal of color, phenol, and total organic carbon (TOC) from textile, food, chemical, plastics, rubber, metal, pharmaceutical, petroleum, and paper mill effluents are summarized. In 72% of all samples treated with activated carbon, 85% or better TOC removals were achieved. In more than 90% of the samples, color removals of 98% and phenol removals of 99% were attained. Problems remain regarding the adsorption of low-molecular-weight contaminants (having less than three carbon atoms per molecule) and of highly polar compounds (acids and alcohols). (Buchanan-IPC)
W74-09461

A PRELIMINARY INVESTIGATION OF RADIATION-ENHANCED OXIDATION OF PULP MILL EFFLUENTS FOR COLOR REDUCTION,
Oak Ridge National Lab., Tenn.
F. N. Case, and E. E. Ketchen.
NCASI (National Council of the Paper Industry for Air and Stream Improvement, Inc.) Stream Improvement Technical Bulletin, No 271, Feb, 1974, 18 p. 3 fig, 12 tab.

Descriptors: *Waste water treatment, *Oxidation, *Pulp wastes, *Gamma rays, *Radiation, *Color, *Activated carbon, Pulp and paper industry, Research and development, Oxygen, Pressure, Effluents, Industrial wastes, Water purification, Waste treatment, Adsorption.

Color reductions of 90% or better in pulp mill effluents were achieved by gamma-irradiation in the presence of oxygen at 500 psi. Also explored was the in situ radiation-induced reactivation of spent carbon adsorbent, but with inconclusive results. (Buchanan-IPC)
W74-09464

WASTE WATER LOADS AND THEIR POSSIBLE REDUCTIONS IN THE FINNISH FOREST INDUSTRY (SUOMEN METSAETEOLLISUUDEN JAETIEVESIKUORMITUS JA SEN KEHITYSNAEKMAT),
Finnish National Water Board, Helsinki.
For primary bibliographic entry see Field 5B.
W74-09465

SOIL CLOGGING DURING INFILTRATION OF SECONDARY EFFLUENT,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
R. C. Rice.
Journal Water Pollution Control Federation, Vol 46, No 4, p 708-716, April, 1974. 9 fig, 1 tab, 12 ref.

Descriptors: *Soil disposal fields, *Soil contamination, *Infiltration, *Clogging, *Waste water treatment, *Groundwater recharge, Suspended solids, Infiltration rates, Hydraulic gradient, Algae, Soils, Soil dynamics, Soil physical properties, Soil moisture, Soil texture, Flooding, Water sources, Irrigation effects, Groundwater, Water types, Water resources, Water pressure, *Water reuse.

Maintaining high infiltration rates is a primary requirement when groundwater recharge facilities are used for reclamation of waste water effluent. Studies conducted in laboratory soil columns showed that clogging by suspended solids deposited on the soil surface was the predominant cause of infiltration reduction. Suspended solids concentrations should be kept below the 10 mg/liter for maximum infiltration. Soil clogging caused by biological activity was minimal. Algal growth on the soil surface restored the infiltration rate during inundation. High hydraulic gradients should be maintained when intermittent inundation schedules are used. (Witt-IPC)
W74-09467

BIOLOGICAL TREATABILITY OF TRINITROTOLUENE MANUFACTURING WASTEWATER,
Air Force Academy, Colo.
M. W. Nay, Jr., C. W. Randall, and P. H. King.
Journal Water Pollution Control Federation, Vol 46, No 3, p 485-497, March, 1974. 10 fig, 6 tab, 13 ref.

Descriptors: *Waste water treatment, *Industrial wastes, *Chemical wastes, Chemical industry, Biodegradation, Biochemical oxygen demand, Explosives, Biota, Metabolism, *Virginia, Toxicity, Microorganisms, Aquatic life, Nitrogen compounds.
Identifiers: *Trinitrololuene, *Radford(Va.) Army Ammunition Plant, Continuous process, Batch process.

A recent innovation in trinitrotoluene manufacturing has been the development of the countercurrent continuous flow process. Early studies that showed the waste to be toxic and refractory and the possibility of biological treatment to be marginal were done with waste samples from the older batch process. The new continuous process recycles many of the raw components to insure full use of their chemical potentials, and the waste water from this process is potentially more amenable to biological treatment. Biodegradability of trinitrotoluene waste water was demonstrated using dynamic BOD tests. The biota metabolism decreased as the trinitrotoluene concentration increased, illustrating that the waste has a threshold of toxicity to microbial systems. The rate of trinitrotoluene metabolism was slow compared with that of domestic waste water. A field-scale pilot plant for treating trinitrotoluene manufacturing wastes at the Radford Army Ammunition Plant in Virginia is proposed. (Witt-IPC)
W74-09470

FLOW SMOOTHING IN SANITARY SEWERS,
Environmental Protection Agency, Springfield, Ill.
C. N. Click, and F. O. Mixon.
Journal Water Pollution Control Federation, Vol 46, No 3, p 522-531, March, 1974. 16 fig, 2 tab, 11 ref. EPA 11010 FDI.

Descriptors: *Flow control, *Sewerage, *Waste storage, *Pipelines, *Economic feasibility, *Municipal wastes, Population, Interest rates, Cost comparisons, Flow characteristics, Design flow, Sewage treatment, Waste treatment.
Identifiers: Flow smoothing, *Flow smoothing basins, Relief piping.

Municipal waste water systems are usually designed with sufficient capacity to carry peak flows. However, as population grows and more load is placed on the normal municipal sewerage system, the point is inevitably reached at which the peak waste water flows exceed the design capacity of the sewerage system and additional capacity is needed. One possible way to provide this additional capacity is to install flow smoothing basins at key locations within the system. These basins would store waste water during periods of high delivery and release it later into the downstream piping at more nearly constant rates. A study was made to assess the feasibility of flow smoothing and to compare it with relief piping as a method of increasing the capacity of existing sewerage systems. The results show that circumstances that favor flow smoothing are high interest rates, high peak-to-average flow ratios, low pipe slopes, small pipe diameters, and low design depths of flow. Flow smoothing is strongly favored where earthen construction can be utilized. (Witt-IPC)
W74-09471

JOINT TREATMENT OF MUNICIPAL AND PULP MILL EFFLUENTS,
Green Bay Metropolitan Sewerage District, Wis.
K. G. Voelkel, D. W. Martin, and R. W. Deering.
Journal Water Pollution Control Federation, Vol 46, No 4, p 634-656, April, 1974. 14 fig, 11 tab, 11 ref.

Descriptors: *Municipal wastes, *Pulp wastes, *Activated sludge, *Waste water treatment, Pulp and paper industry, *Wisconsin, Bacteria, Chlorination, Nutrients, Sulfur bacteria, Pilot plants, Solids contact processes, Effluents, Industrial wastes, Sewage districts.
Identifiers: *Joint treatment, *Green Bay(Wis), Contact stabilization, Kraus process.

A project was undertaken to determine the feasibility of jointly treating Green Bay (Wisconsin) Metropolitan Sewerage District waste water with weak effluents from several paper manufacturers (American Can Co., Charmin Paper Products Co., Fort Howard Paper Co., and Green Bay Packaging Inc.), all located in Green Bay. Conventional, step aeration, contact stabilization, and Kraus activated sludge processes were studied simultaneously in four 1 gal/min (3.8 liters/min) pilot plants. Contact stabilization was selected as the most promising process and was studied further. After initial startup, the pilot plants became infested with the filamentous bacterium Thiothrix, a sulfur-storing organism. Chlorination of return activated sludge controlled its growth. Nutrient addition also was necessary. (Witt-IPC)
W74-09473

POSSIBILITIES FOR REDUCING THE EFFLUENT LOAD OF SULFITE PULP MILLS (MOEGLICHKEITEN ZUR BEHEBUNG DER ABWASSERBELASTUNG DURCH SULFITZELLSTOFFANLAGEN),
R. Fuechsel.
Das Oesterreichische Papier, Vol 10, No 9, p 13-15, 17-19, Sept, 1973. 6 fig.

Descriptors: *Treatment facilities, *Pollution abatement, *Pulp wastes, *Incineration, *Sulfite liquors, Water pollution control, Magnesium compounds, Magnesium hydroxide, Byproducts, Pulp and paper industry, *Waste water treatment.
Identifiers: *Sulfite pulp mills, *Chemical recovery, *Heat recovery, Copeland recovery process, Lenzing recovery process, Babcock recovery process, Spent sulfite liquors, Spent pulping liquors, Magnesium bisulfite.

Three systems for the recovery of chemicals and energy (heat) from magnesium-base spent sulfite pulping liquors are outlined and compared, all of which are effective in reducing the pollution load of discharged effluents. These systems make use of the Babcock, Lenzing, or Copeland recovery processes. The Babcock process involves co-current combustion, the Lenzing (Austrian) process counter-current combustion, and the Copeland process (developed by Container Corp. of America) fluidized-bed combustion of the spent liquors. The respective equipments used are described in some detail, including combustion chambers, absorption towers, venturi gas scrubbers, and the like. (Speckhard-IPC)
W74-09474

PAPER INDUSTRY AND ENVIRONMENTAL QUALITY,
International Paper Co., Ticonderoga, N. Y. Solid Waste Management.
C. S. Edgar.
Modern Lithography, Vol 40, No 8, p 12-15, 46, Aug, 1972. 2 illus.

Descriptors: *Pulp and paper industry, *Waste water treatment, *Fibers(Plant), *Recycling, *Environmental control, Resources, *Water conservation, Solid wastes, Water reuse.
Identifiers: Closed systems, Linear systems, Wood, Waste paper.

Energy, raw materials, and waste disposal are separate but critically important and interconnected parts of the paper industry's total environmental problem. Nature solves its energy, resources, and waste problems by way of closed systems. Emulating this example, the industry's artificial linear system with waste as an end-product must be changed into a circular or closed system, in which waste must serve as a resource. Although the paper industry's major raw materials (wood and water) are renewable resources, problems are encountered in utilization of waste products remaining after consumer use. Recycling or reuse of secondary fibers (waste papers) is one way of resource utilization, but is neither the only way nor always the best one. (Witt-IPC)
W74-09475

THE BEHAVIORS OF HEAVY METALS IN THE REGENERATION PROCESS OF SEWAGE TREATMENT ACTIVATED CARBON, (GESUI SHORI KASSEITAN NO KANETSU SAISEIJI NI OKERU JUKINZOKU NO KYODO),
Yokohama National Univ. (Japan). School of Engineering.
K. Urano, and K. Nakamura.
Gesuido Kyokai-shi, (J. Japan Sewage Works Association), Vol 10, No 115, p 19-22, December, 1973. 6 ref.

Descriptors: Sewage treatment, *Activated carbon, *Tertiary treatment, Metals, Treatment facilities, *Heavy metals, Municipal wastes, Waste water treatment.
Identifiers: *Secondary pollution, Reactivation.

The possibility of causing air pollution as a secondary pollution during the regeneration of particulate activated carbon by a heating process utilized in various sewage treatment plants was examined by measuring the heavy metal content released from the carbon. Six kinds of activated carbons used at various treatment plants were dried, packed in quartz tubes, and heated at various temperatures between 200 deg and 960 deg C for 10 to 80 minutes. After heating, the carbon was cooled in nitrogen, and 100 ml of 25 percent nitric acid was added. After boiling for two hours the carbon was filtered, diluted by distilled water, and analyzed for copper, chromium, manganese, lead, zinc, and mercury by atomic absorption. The results showed that activated carbon utilized in sewage treatment contained (per 1 kg of dry material), 800-1700 mg Cu, 150-1800 mg Cr, 15-80 mg Mn, 5-20 mg Pb, 500-1700 Zn, and 0-5 mg Hg. Since activated carbon before being used for sewage treatment contained almost no heavy metals, it was assumed that metals adsorbed on carbon due to the treatment process were considerable. Hg compounds at 200 deg C or more, and Zn and Pb compounds at 800 deg C are gasified when regenerating carbon. Since part of these metals will be released in the flue gas, it is necessary to install flue gas treatment system for reactivating used activated carbon. (Seigle-FIRL)
W74-09482

THE LAND TREATMENT PROCESS FOR WASTEWATER RENOVATION,
Illinois, Univ., Urbana. Dept. of Agronomy.
T. D. Hinesly.
Public Works, Vol 105, No 2, p 62-66, February, 1974.

Descriptors: Land management, Land use, *Soil management, *Irrigation, *Mist irrigation, Infiltration rates, *Infiltration, *Percolation, *Water treatment, Municipal wastes, *Waste water treatment.

The land treatment process for wastewater renovation is discussed with emphasis on spray irrigation. There are three distinct types of land treatment systems: overland flow, rapid infiltration/percolation, and crop irrigation. An overland flow land treatment system is used for soils with very low infiltration and/or percolation capacities. Rapid infiltration/percolation systems are used where deep permeable soil materials are available. The crop irrigation system may embody various methods of applying secondary-treated effluents by spray applications or flooding on land through furrows or borders. Spray irrigation has the greatest applicability to different soil types and cultural practices. This treatment may be used on varying terrain, requires less land preparation, and is less labor intensive when compared to other methods of irrigation. Maximum benefits are realized from the plant and animal nutrients recycled in growing plants, which is a most important reason for choosing irrigation over other systems. Maintaining a water-unsaturated aerobic zone in the soil surface ensures more complete filtering and adsorbing of wastewater pollutants. The site should be selected so that the frequencies and rates of water applications will be limited by the soil's capacity to filter, absorb, and precipitate pollutants, rather than by soil hydraulic characteristics. (Merritt-FIRL)
W74-09486

SELECTION OF THE IRON AND MANGANESE REMOVAL PROCEDURES TO BE USED IN SMALL WATER TREATMENT PLANTS (ALEGEREA SCHEMELOR DE DEFERIZARE SI DEMANGANIZARE A APEI LA STATIILE DE TRATARE MICI),
S. Nitescu.
Hidrotechnica, Vol 18, No 11, p 573-578, November, 1973. 13 ref.

Descriptors: Effluents, Municipal wastes, *Treatment methods, *Pilot plants, Aeration, Oxidation, Metals, *Iron, *Manganese, *Waste water treatment.

A simplified method for selecting the iron and manganese removal procedures to be used in small water treatment plants is presented. Usually the

removal procedures are selected by means of a pilot station. The cost of a pilot plant at a small treatment plant is high, due to the fact that the cost of the pilot station is almost equal to the cost of the production installation itself. Various factors have been verified which allows its elimination. The removal procedures are selected on the basis of physicochemical indices which are described and discussed. The procedures under consideration are aeration of water, oxidation of ferrous and manganese compounds, treatment with substances which increase the water's alkalinity, treatment of water with coagulant substances, decantation and filtration. Methods for differentiation of waters containing iron and manganese, treatment of water with mineral content, treatment of water with alkaline substances, or oxidizing substances, as well as methods for treatment of water with humic iron and manganese compounds, are presented. After selection of removal method, it is necessary to experiment on models in order to determine the optimum filtration parameters and chemical doses. (Urbanski-FIRL)
W74-09487

SPEED UP WATER PLANTS,
. R. Camp, and W. J. Kreske.
Water and Wastes Engineering, Vol 11, No 1, p 27-9, January, 1974. 1 fig.

Descriptors: Water treatment, Flocculation, Filtration, *Pre-treatment(Water), Costs, Monetary benefits, Pilot plants, *Massachusetts, Municipal wastes, *Waste water treatment.
Identifiers: *New Bedford(Mass).

A process to condition floc for filtration is described that eliminates sedimentation, reduces the needed size of flocculation units, and cuts chemical costs, while giving faster throughput. The basis for the Thomas R. Camp process is the relationship of floc volume concentration to mean velocity gradient. The method as claimed in the patent, U.S. 3,660,284, applied to operating conditions whereby water of wastewater is treated with from 6-50 ppm of floc-forming chemical in a mixing chamber operating at a mean velocity gradient corresponding to values of floc volume concentration between 50-300 ppm. The G values necessary to achieve the floc volume concentrations desired vary from about 150 to 1000 per second, and flocculation is essentially complete after five minutes of mixing at these speeds. A ten-month field test in New Bedford, Massachusetts, indicated that the Camp process was commercially feasible when applied to the highly colored water currently being used at New Bedford. The process saved New Bedford $1.75 million in capital for a new 30 mgd facility by eliminating the need for sedimentation basins. Savings in annual operating costs of a minimum of $15,000 could be achieved from reduced chemical requirements. (Merritt-FIRL)
W74-09488

PIONEERING PLANT PROVIDES COST-SAVING ALTERNATIVE TO SEPARATING SEWERS.
The American City, Vol 88, No 10, p 90-92, October, 1973. 2 tab.

Descriptors: Waste treatment, *Water treatment, Runoff, *Storm runoff, Lakes, *Cities, Wisconsin, *Combined sewers, *Treatment facilities.
Identifiers: *Kenosha(Wisc).

A modified contact stabilization process to produce a high quality effluent under stormflow conditions was utilized in Kenosha, Wisconsin. The runoff is degritted, mixed with activated sludge solids, clarified, and stabilized in four additions to the existing waste treatment plan: grit tank, contact tank, final clarifier, and stabilization unit. The entire process is automated and selected from the plant's main control board. Wet weather conditions are signalled by a level indicator in the dry weather grit tank's Parshall flume when the flow rises above 21 mgd. Biological adsorption was used because the first flush of the storm contains a high ratio of praticulate organic matter to soluble organics. In the first year of operation, the wet weather plant was activated 23 times with more than 92 million gallons of combined sewage treated. As a result, 91.5 percent of the suspended solids, 82.5 percent of the BOD, and 79.8 percent of the total organic carbon in that waste stream was kept out of Lake Michigan. (Merritt-FIRL)
W74-09490

PLATING POLLUTION: THE LATEST FROM EPA, PART 1,
For primary bibliographic entry see Field 5B.
W74-09491

CHECKING THE SIZE OF SEWERAGE INFILTRATION AND LEAKS OCCURRING UNDER OPERATING CONDITIONS, (VERIFICAREA MARIMII INFILTRATIILOR SI EXFILTRATILOR DIN CANALIZARI IN TIMPUL EXPLOATARII),
E. Blitz, and G. Tatu.
Hidrotehnica, Vol 18, No 6, - 283-288, 1973. 6 ref.

Descriptors: *Sewers, Engineering structures, Municipal wastes, Mathematics, *Infiltration, *Mathematical studies.

Some simple tools for checking the degree of infiltration of sewage systems as well as calculation methods are presented. Sewage infiltration and leaks under operating conditions can affect the functioning of the sewage system and the neighboring constructions. Since not all sewers can be provided with improved modern checking devices, simple verification and calculation methods had to be devised. Calculation methods are given for both ovoidal and circular sewage sections, using both mathematical formulae and tables. (Urbanski- FIRL)
W74-09493

A CASE STUDY OF CHLORINE CONTACT TANK INADEQUACIES,
Illinois State Water Survey, Urbana. Water Quality Section.
V. Kothandaraman, and R. L. Evans.
Public Works, Vol 105, No 1, p 59-62, January, 1974. 3 fig, 2 tab, 11 ref.

Descriptors: Waste treatment, *Treatment facilities, *Illinois, *Dissolved oxygen, Coliforms, *Chlorine, Municipal wastes, *Waste water treatment, Chlorination.
Identifiers: *Chlorine Contact Tank.

The physical, chemical, and bacteriological performance characteristics of the chlorine contact tank of the Pekin, Illinois, waste treatment plant were evaluated under air agitated and quiescent conditions. The hydraulic flow characteristics were determined by adding Rhodamine-B dye at the outlet end of the circular launder of the secondary settling tank. Samples were taken at the outlet end. Simultaneously samples were obtained from the inlet and outlet ends of the chlorine contact tank for pH and temperature measurements, residual chlorine determinations, and bacteriological analyses. The injected dye took five to ten minutes to be completely mixed, depending upon the rate of flow through the tank. Chemical and bacterial performance characteristics of the chlorine contact tank with and without air agitation were determined. The dissolved oxygen at the outlet was high (3.3 to 6.0 milligrams/liter) even though the dissolved oxygen content of the settling tank effluent in the collecting launder was zero or 0.1 milligrams/liter. The residual chlorine of the effluent samples was relatively high, varying from 1.6 to 3.6 milligrams/liter. The fecal coliform count, which is the controlling parameter, was higher than the desired limit in six of eight samples. It was concluded that the residence time distribution of the flow-through in a contact tank is important in obtaining satisfactory bacterial quality. (Merritt - FIRL)
W74-09494

RESTORATION OF WASTEWATER FACILITIES DAMAGED BY TROPICAL STORM AGNES,
Environmental Protection Agency, Washington, D.C. Emergency Operations and Planning Div.
E. K. Ernstrom, G. H. Zachos, and D. E. Braunscheidel.
Water and Sewage Works, Vol 121, No 2, p 42-43, 51-52, February, 1974. 2 tab.

Descriptors: *Flood damage, *Storm runoff, *New York, Waste water treatment, *Treatment facilities, Costs, Sewage, Historic floods, Regional flood, Disasters, Estimates.
Identifiers: *Tropical storm Agnes, Steuben County, N.Y., Chemung County, N.Y., Allegheny County, N.Y.

The recovery and restoration of waste water facilities damaged by tropical storm Agnes in June, 1972 are described. The storm caused severe flooding in New York's Southern Tier counties. Waste water collection and treatment systems sustained several million dollars worth of damage. Individual municipal cases are discussed along with the reactions and roles of local, state, and federal officials. The Environmental Protection Agency assisted in the flood relief and concentrated its efforts in the following areas: emergency repairs to water and sewage utilities; removal of oil and hazardous materials in the disaster area; rendering a preliminary dollar estimate of damages to water and sewage utilities in all 62 counties; and performing initial inspections, detailed cost estimates, eligibility determinations, interim inspections, and final inspections on damaged public utilities in the 26 counties declared eligible. Top priority was given to restoring the public water supply systems. The current total of eligible damages to environmental facilities in the declared counties is $7,218,170, with over 60% of this damage in Chemung, Steuben, and Allegany counties. (Merritt - FIRL)
W74-09496

ECONOMIC IMPACT OF FWPCA WATER EFFLUENT STANDARDS AND GOALS.
Paper Trade Journal, Vol 158, No 13, p 34-38, April 1, 1974. 5 tab.

Descriptors: *Economic impact, *Federal Water Pollution Control Act, *Pulp and paper industry, Water quality, Effluents, Operating costs, Capital costs, Prices, Unemployment, Mills, Energy.
Identifiers: *Amendments, Balance of payments.

The national economic impact of the Federal Water Pollution Control Act Amendments on the paper industry in meeting the water effluent standards and goals is discussed. A survey was conducted to estimate the additional capital and operating costs that the existing paper industry would have to incur to achieve the two assumed water effluent control levels. The water effluent control costs over the range of mill sizes in each product category were compared with current product prices, anticipated profit margins for high cost mills, and the costs of competing foreign mills. It is estimated that $1,200 million will have to be spent for additional capital expenditures. It is estimated the average incremental operating cost for best practical control would increase from $4.50/ton average to $6.00/ton in 1977. There will be several inflationary effects in water effluent control expenditures especially during periods of tight supply/demand. Pulp and paper price increases to the consumer are expected to amount to 7.5-11% at the best practical control level and 19-

62% at the zero discharge level, depending on the product. Other effects include mill closure and unemployment, increased energy use, and impact on balance of payments. (Merritt - FIRL)
W74-09497

SEWAGE AND STORMS GET THE FULL TREATMENT,
R. J. Ganley.
Water and Wastes Engineering, Vol 11, No 1, p 30-31, 37, January, 1974.

Descriptors: *Waste water treatment, Sewage, *Sewage treatment, *Storm water, *New York, Activated sludge, Municipal wastes, *Treatment facilities.
Identifiers: *Catskill(N.Y.)

The construction of a $2.2 million sewage treatment plant capable of handling both storm and sanitary discharges in Catskill, New York, is described. A trickling plant was proposed with modifications to include the use of pre-aeration tanks equipped for the return of activated sludge, and a recirculation pumping rate controlled inversely to the raw sewage inflow rate. The plant can achieve 90-95 percent BOD removal through the use of high rate activated sludge pretreatment, and flow regulation to the primary tanks and trickling filters. The instrumentation and variable speed pumping equipment combining raw with recirculated sewage help provide the desirable constant flow rate to the primary settling tanks and trickling filters. The plant capacity of 1.5 mgd allows for the present Catskill population and its projected growth requirements. The plant is designed to allow a flow, including recirculation, of 3.8 mgd to pass through the primary clarifier and trickling filters before any of the flow is restricted to the filters and bypassed to the final clarifier. To avoid upsetting aerated pretreatment, the pretreated portion of the flow is restricted to approximately 50 percent of the dry weather flow which allows maintenance of the filterability of the raw sludge on the vacuum filters. The plant's raw sewage pumping capacity is 9.0 mgd. (Merritt - FIRL)
W74-09499

AGRICULTURAL WASTE MANAGEMENT,
Oregon State Univ., Corvallis. Dept. of Agricultural Engineering.
J. R. Miner.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE2, Paper 10470 p 363-368, April, 1974.

Descriptors: *Civil engineering, *Farm wastes, *Farm management, *Waste storage, *Waste disposal, Chemical wastes, Waste treatment, Water pollution sources, Pollution abatement, *Waste water treatment.

The role of civil engineering in the management of agricultural wastes is discussed. The problems with agricultural wastes are different from those commonly encountered in the management of municipal wastes. Serious problems have resulted when municipal waste technology has been transferred to the management of agricultural wastes without due consideration for the differences of generation characteristics and chemical characteristics of the waste materials. The management of animal manures requires the utilization of a system that somehow resolves the problems of separation of the manure from the animal, transport, storage or treatment or both and disposal. Under current technology, application to cropland is the most widely practiced disposal method. Treatment is for the purpose of making the manure more amenable to cropland application or for the purpose of changing its physical and chemical characteristics to avoid application difficulties or nuisances attributable to the application. (Merritt - SIRL)
W74-09504

SOME HISTORICAL STATISTICS RELATED TO FUTURE STANDARDS,
Wisconsin Univ., Madison.
P. M. Berthouex.
Journal of the Environmental Engineering Division, American Society of Civil Engineers Vol 100, No EE2, Paper 10468 p 423-437, April, 1974. 13 fig, 2 tab, 7 ref.

Descriptors: *Water quality standards, *Treatment facilities, *Construction, *Engineer estimates, *Forecasting, Design standards, Population, Statistical methods, Control, *Standards.

Areas of uncertainity that have relevance in the current water quality standards are discussed including treatment plant construction dilemma and the lack of precision in the language of the standards. Population and demand for forecasting have always added an unavoidable element of risk, but it is very possible that changing standards are the factor most likely to force redesign before the end of the intended design period. If control programs based on rational statistical methods are ever to be developed, it is necessary for effluent target levels and permissible variation to be clearly defined. In doing so, allowance should be made for natural variations and for analytical errors. Possible skewness in the distribution of results should also be noted and given consideration. When both a mean and upper performance level are set, the mean may be redundant if care is not taken to make the two levels consistent. This problem of consistency could be avoided most easily by simply using a 95% upper bound as the standard. (Merritt - FIRL)
W74-09505

STATE-OF-THE-ART OF WASTE DISPOSAL IN THE COATINGS INDUSTRY (AS OF JUNE 1973),
For primary bibliographic entry see Field 5E.
W74-09506

CONTROL OF BIOLOGICAL SOLIDS CONCENTRATION IN EXTENDED AERATION,
Cornell Univ., Ithaca, N.Y.
P-Y. Yang, and A. F. Gaudy Jr.
Journal of Water Pollution Control Federation, Vol 46, No 3, p 543-553, March, 1974. 10 fig, 2 tab, 7 ref. OWRR A-017-OKLA(2) + A-035-OKLA(2).

Descriptors: *Pilot plants, *Activated sludge, *Aeration, Recycling, Carbohydrates, Solids, Biomass, Hydrolysis, Waste water treatment.
Identifiers: Sludge proteins, Biological solids, Hydrolytic assist.

A 200-day test period showed that extended aeration activated sludge process with total sludge recycle can be operated successfully using hydrolytic assist to control the mixed liquor biological solids concentration. Thus, the process was made independent of natural periods of accumulation and de-accumulation of biological solids and showed a good ability to accept shock loading. Sludge carbohydrate and protein were within ranges indicating a metabolically active biomass, and the unit respiration activity of the sludge (endogenous 02 uptake values) was slightly higher than that obtained using total cell recycle without hydrolytic assist. Pilot plant operation using the process is still in progress to provide design and operating guidelines. (Prague-FIRL)
W74-09508

RAIN RESERVOIRS AND RAIN OVERFLOWS (REGENBECKEN UND REGENENTLASTUNGEN),
For primary bibliographic entry see Field 4A.
W74-09509

IRON REMOVAL IN MUNICIPAL TREATMENT PLANTS,
S. R. Goswami.
Water and Sewage Works, Vol 120, No 10, p 52-55, 82-84, October, 1973. 7 fig, 2 tab, 7 ref.

Descriptors: Treatment, *Groundwater, *Iron, *Waste water treatment, Municipal water, *Monitoring, *Oxidation-reduction potential.

The presence of iron in groundwater and through the various stages of treatment in selected municipal water treatment plants was related to data obtained in field studies at the same locations. Experimental parameters measured were pH, oxidation-reduction potential (Eh), temperature, alkalinity, dissolved oxygen, ferrous, filterable ferrous, and total iron. Field data at particular raw water wells and operational data of raw, aerated, filtered, and softened waters of municipal treatment plants treating iron-bearing groundwaters were compiled. The ranges of Eh for raw and aerated waters of treatment plants treating iron-bearing groundwaters are between 180 to 370 mv and 380 to 500 mv, respectively. The Eh is considerably increased by chlorination at any stage of treatment. The range of ferrous iron concentration varied from 1.30 to 9.09 mg. The Eh appears to be a useful analytical test in controlling the various stages of treatment of iron bearing groundwaters. There is a general correlation between the increase in Eh with decrease in filterable ferrous iron content. The variation of Eh from raw to finished water is an excellent parameter indicating the efficiency of treatment processes. The Eh measurements could be incorporated in the water treatment plants as an automatic monitoring device as used in waste treatment plants. (Merrill-FIRL)
W74-09510

STUDIES ON THE SUITABILITY OF MICROS TRAINERS FOR THE REMOVAL OF SUSPENDED MATTER FROM BIOLOGICAL CLEARING FACILITY EFFLUENT (UNTERSUCHUNGEN UEBER DIE EIGNUNG DES MIKROSIEBES ZUR ENTNAHME SUSPENDIERTER STOFFE AUS DEN ABLAEUFEN BIOLOGISCHER KLAERANLAGEN),
B. Hanisch.
Schweizerische Bauzeitung, Vol 91, No 39, p 94(949, September, 1973. 6 fig, 2 ref.

Descriptors: *Filters, *Separation technique, Bacteria, Suspended solids, Treatment, *Waste water treatment.
Identifiers: *Microstrainers.

Microstrainers for the removal of suspended matter from biological wastewater treatment plant effluents, and experiments with such microstrainers, are described. Microstrainers constitute horizontal rotary drums with very fine steel wire mesh of 23 or 35 microns on their surfaces through which the purified effluent passes from the inside to the outside. The retained particles form a filter layer on the inside of the drum, and thus help retain very small suspended particles. Zoogleal bacteria are controlled by UV irradiation. The strainer resistance, i.e., the water level difference between the inside and the outside of the drum ranges from 10 to 15 cm. Experiments with a microstrainer on the removal of suspended matter from biological wastewater treatment plant effluents revealed a retention efficiency of 33 percent from an effluent mixed return sludge, and a BOD5 reduction of 26-73 percent. Purified effluents from a percolation filter, passed through a microstrainer, experienced a reduction in the suspended matter content from 26-164 mg/liter to 5-36 mg/liter, and a BOD5 reduction from about 110 mg/liter to less than 25 mg/liter. The strainer efficiency and the optimum operating parameters such as the rotational and peripheral speeds, strainer resistance, and flushing water expenditure, are basically determined by the properties of the suspended matter and of the strainer fabric. (Takacs-FIRL)
W74-09511

BETTER STORM DRAINAGE FACILITIES--AT LOWER COST,
H. G. Poetner.
Civil Engineering-American Society of Civil Engineers, Vol 43, No 10, p 67-70, October, 1973. 2 fig.

Descriptors: *Water storage, Storm water, *Storm runoff, Drainage systems, *Reservoir storage, Missouri, Missouri River, Illinois, Colorado, *Recreation, *Treatment facilities, Waste water treatment.
Identifiers: Indian Lake Estates, Denver, Melvina Ditch Reservoir.

Successful and economical applications of detention facilities for stormwater are described for use in open spaces, parking lots and rooftops. The design of the stormwater drainage system at Indian Lakes Estates in Illinois is illustrated. Two lakes detain stormwater runoff and make the area more attractive. One of the lakes is manmade and its existence has increased property value for adjoining acreage. In Earth City, Missouri, the Missouri River bottomland was developed with intersecting finger lakes providing stormwater detention. The lakes are an esthetic and recreational asset to the community. A specially designed ponding ring surrounds a roof drain conductor head on some buildings in Denver. The device slows runoff and is used for rainfall detention on the roof. In the layout of Melvina Ditch reservoir, a paved area prevents erosion at the inlet, and is used for recreational purposes. (Merritt-FIRL)
W74-09513

PITFALLS IN PARAMETER ESTIMATION FOR OXYGEN TRANSFER DATA,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 5A.
W74-09514

ALUMINUM PIT DOORS PROVIDE EASY ACCESS TO A RETENTION BASIN.
Water and Sewage Works, Vol 20, No 10, p 62-63, October, 1973.

Descriptors: *Storm drains, *Michigan, *Storm waters, Storage, Water storage, *Retention, Waste water treatment.
Identifiers: *Aluminum doors, *Narren(Mich).

The use of aluminum pit doors to provide easy access to the 50 million gallon underground stormwater retention basin in Warren, Michigan is discussed. The 42 heavy plate doors float on compression spring operators and automatically lock open, providing safety and easy handling. The five foot pit doors are completely watertight and provide a flush surface for walkover traffic. The channel frames trap surface water which is directed to a drywell. Doors are built for a minimum live load of 300 psf. The lock opens at 90 degrees, but can be released with one hand. The two large, special size roof scuttles were installed to permit installation and removal of large equipment. (Merritt-FIRL)
W74-09515

HOW TRIPLE SIPHON SOLVED SEWAGE TRANSFER ACROSS WELLAND RIVER,
L. Webster.
Engineering and Contract Record, Vol 88, No 10, p 54-55, October, 1973.

Descriptors: Rivers, *Canada, *Sanitary engineering, Treatment, Disposal, Plastics, *Plastic paper, Waste water treatment, *Siphons, *Sewers.
Identifiers: *Welland River(Ont), Niagara Falls(Ont).

The use of a novel triple siphon system across the Welland River on Ontario's Niagara Peninsula is described. Sanitary wastes originating on one side of the river are conveyed to the City of Niagara Falls pollution control plant across the river for treatment and disposal. Excavations were required for large manholes on each bank of the river, one to serve as an inlet structure, the other an outlet structure, for the siphons. A dewatering system was designed to secure the excavations against the hydrostatic pressure from the underlying silt layer. The use of polyethylene pipe for the siphons to effect the actual river crossing contributes to a substantial savings over a design calling for the underwater installation of more conventional materials. (Merritt-FIRL)
W74-09517

RURAL WATER SYSTEM DESIGNED FOR SUBURBAN USE,
For primary bibliographic entry see Field 5F.
W74-09519

MAGNETIC CLARIFIER.
Engineering News-Record, Vol 191, No 20, p 23, November 15, 1973.

Descriptors: *Massachusetts, Rivers, Treatment, *Recycling, Sludge, Mining, Iron, *Waste water treatment, Water reuse, Separation technique.
Identifiers: Magnetic clarifier, Apparatus, Magnetic separation, Boston(Mass), *Charles River(Mass), Bottom waters, *Iron filings.

The application of an instream magnetic separation process for cleaning the bottom waters of Boston's Charles River is described. The process has previously been used only in the mining and clay industries. It involves distributing very finely ground iron filings throughout water that has been pumped up through a suction device from the river bottom. Chemicals are added to coagulate the pollutants and iron filings, and to improved the electrolytic property of the water. The water is run through a high intensity electromagnetic field which attracts the solids. The separated material is again put through a magnetic field to recovery iron filings for reuse. The treated water is returned to the river while the sludge is temporarily stored in a barge. (Merritt-FIRL)
W74-09520

THE PHOSPHATE PRECIPITATION IN COMMUNAL WASTE WATERS (DIE PHOSPHATFAELLUNG IN KOMMUNALEM ABWASSER),
Knapsack A. G., Cologne (West Germany).
D. Gleisberg, J. Kandler, and G. Peantek.
Chemie-Ing.-Techn., Vol 45, No 20, p 1225-1226, 1973. 2 fig, 1 tab.

Descriptors: *Phosphates, Treatment, *Biochemical oxygen demand, *Chemical oxygen demand, Water pollution treatment, Treatment facilities, *Anabaena, Algae, *Waste water treatment, *Chemical precipitation, Inhibition.

The possibility of the chemical precipitation of phosphates and of the reduction of the BOD and COD values in municipal wastewater was studied at a wastewater treatment plant serving some 10,000 inhabitants. Precipitation, coprecipitation, and direct precipitation were studied. The precipitant used were aluminum sulfate containing 15 percent alumina, and ferric sulfate with about 43 percent ferric oxide. The precipitation was conducted in a mixing tank. The phosphate:Al and phosphate:iron ratios were set at 1:1.27 and 1:2.4, respectively. The pH value averaged 7.5. Precipitation of 80 percent of the orthophosphate ions in about ten seconds was determined. The efficiency of preprecipitation, coprecipitation, and direct precipitation in terms of phosphorus removal was 97-99 percent, 93-94 percent, and 97-98 percent, while mechanical-biological purification without precipitation has an efficiency of 10 percent only. The reduction in the BOD5 values was 93-99 percent for preprecipitation, 83-88 percent for coprecipitation, and 60-77 percent for direct precipitation, compared to a control value of 94 percent for the case of biological treatment. The corresponding figures for the reduction of the COD were 84-91 percent, 6074 percent, 55-59 percent, and 67 percent. Water samples taken after chemical precipitation of the phosphates, and incubated with Anabaena flos-aquae, considerably inhibited algal growth. (Takacs-FIRL)
W74-09521

MEMBRANE REGENERATION FOR WASTEWATER RECLAMATION USING REVERSE OSMOSIS,
Hebrew Univ., Jerusalem (Israel). Human Environmental Sciences Program.
G. Belfort, F. E. Littman, and H. K. Bishop.
Water Research, Vol 7, No 11, p 1547-1559, 1973. 11 fig, 2 tab, 10 ref.

Descriptors: *Waste water treatment, *Reverse osmosis, *Water reuse, Engineering estimates, Design, Cost analysis, Operating costs, *Membranes.
Identifiers: Reverse osmosis membranes.

An increasingly viable source of water is waste water reclamation. Essential to the treatment process is demineralization. Recently, this task has been accomplished through reverse osmosis but this method is subject to potential plugging and simultaneous product flux-decline of the membranes. While two methods--periodic clearing and extensive pretreatment have been used to correct this problem, the third method described is presently economically feasible and allows for in situ replacement of cellulose acetate membranes. In the regenerable design unit the brine flows on the outside of the tank while the product, permeating the membrane covering, is collected in a reservoir. The degraded membrane is dissolved through pumping acetone into the unit. Coating solutions are then pumped into the unit to form the membrane and subsequent gelling is achieved by pumping ice water through the unit. To test the effectiveness of the methodology, the membrane replacement cycle was repeated six times with average water fluxes of 13 gal/sq ft/day and salt rejections of between 78-85%. Projected membrane costs are reduced from $4.06/sq ft for a 6-in dia module to 8 cent/sq ft for a 72-in dia module making the latter economically attractive. Tests on primary and secondary sewage are presented and design and cost computer parametrization are discussed. (Schroeder-Wisconsin)
W74-09554

SOME CONSERVATION PROBLEMS IN THE METAL-FINISHING INDUSTRY,
Bostock, Hill and Rigby, Birmingham (England).
R. K. Chalmers.
Chemistry and Industry, p 554-557, June 1973. 3 tab, 7 ref.

Descriptors: *Industrial wastes, *Recycling, *Metals, Flow, Effluents, *Waste water treatment, Chemical wastes, Water quality standards.
Identifiers: *Metal finishing wastes.

Losses of high quality process materials in the metal-finishing industry can be lessened by simple measures in the processes to reduce water consumption, effluent discharge volumes, and amounts of contaminants discharged to the drains as well as by water re-use measures. Methods for reducing water consumption are offered and a few examples are cited showing the effectiveness of these methods. Drag-in and drag-out from plating tanks can be minimized by air blasts, drainage techniques, wetting agents, and spray or intermittent rinses as a means of minimizing amounts of contaminants discharged to drains. Some companies involved in the use of large amounts of water are now aiming at 100% water recycle. Conditions necessary for re-use of effluents and approaches to treatment of effluents are listed and recommendations applicable to specific problems are discussed. Effluent standard determination is

mentioned and a list is included of reasonable limits in mg/l of contaminants in receiving waters suited for drinking supplies. (Jernigan-Vanderbilt)
W74-09577

MEMBRANE SCIENCE AND TECHNOLOGY.
Proceedings of Symposium held at the Columbus Laboratories of Battelle Memorial Institute, October 20-21, 1969, Columbus, Ohio: Plenum Press, New York, N.Y., 1970 (second printing 1973). 230 p, $27.00.

Descriptors: *Membranes, *Membrane processes, *Waste water treatment, *Water treatment, Filtration, Reverse osmosis, Water purification, Water reuse, Water pollution control.

A conference on membranes was held at the Columbus Laboratories of Battelle Memorial Institute in Columbus, Ohio, on October 20 and 21, 1969. Membranes are used to fractionate, purify, or concentrate primarily aqueous solutions containing small dissolved ionic and neutral solutes and much higher molecular weight compounds, including proteins, enzymes and viruses. These types of systems present problems which are quite different to those encountered in simple water recovery from sea or brackish water. Cake buildup on the membrane surface, clogging of pores, adsorption in and on the membrane, rheological limitations on the mass transfer of solute and solvent due to viscosity, shear, and non-Newtonian fluid effects, are examples. Many of the papers in this volume deal with or allude to these problems and provide useful insights into their causes and preventions. (See W74-09634 thru W74-09637)
W74-09633

LOW-PRESSURE ULTRAFILTRATION SYSTEMS FOR WASTEWATER CONTAMINANT REMOVAL,
Massachusetts Univ., Amherst., and Iowa Univ., Iowa City.
W. L. Short, R. T. Skrinde, and D. G. Newton, Jr.
In: Membrane Science and Technology; Proceedings of Symposium held at the Columbus Laboratories of Battelle Memorial Institute, October 20-21, 1969, Columbus, Ohio; Plenum Press, New York, N.Y., p 188-195, 1970 (second printing 1973). 3 fig, 2 tab, 16 ref.

Descriptors: *Waste water treatment, *Membrane processes, Filtration, Membranes, Reverse osmosis, Sewage treatment, Pulp wastes.

The membrane process of reverse osmosis, developed initially for use in desalination, is a promising method for treatment of wastewaters. The effect of surfactants was evaluated during low-pressure ultrafiltration of dilute raffinose solutions. The raffinose rejection is essentially independent of surfactant concentration and is, in fact, nearly constant at 80-85 percent. The surfactant, in addition to not altering the raffinose rejection, had no discernible effect on the permeate flux. (See also W74-09633) (Knapp-USGS)
W74-09634

INDUSTRIAL WASTE TREATMENT OPPORTUNITIES FOR REVERSE OSMOSIS,
Eastman Chemical Products, Inc., Kingsport, Tenn. Polymer Technology Div.; and Eastman Chemical Products, Inc., Kingsport, Tenn. Photographic Technology Div.
J. G. Mahoney, M. E. Rowley, and L. E. West.
In: Membrane Science and Technology; Proceedings of Symposium held at the Columbus Laboratories of Battelle Memorial Institute, October 20-21, 1969, Columbus, Ohio: Plenum Press, New York, N.Y, p 196-205, 1970 (second printing 1973). 6 fig, 4 tab, 1 ref.

Descriptors: *Reverse osmosis, *Membrane processes, *Industrial wastes, *Waste water treatment, *Water reuse, Reclaimed water, Byproducts, Chemical wastes, Water pollution control.

Processing industrial wastes by reverse osmosis or ultrafiltration can bring about process economies by recovery of the valuable materials dissolved in the waste stream, by recovery of high quality water for reuse, and by concentration of pollutants for disposal. (See also W74-09633) (Knapp-USGS)
W74-09635

ULTRAFILTRATION WATER TREATMENT,
Dorr-Oliver Inc., Stamford, Conn.
For primary bibliographic entry see Field 5F.
W74-09636

REVERSE OSMOSIS: APPLICATION TO POTATO-STARCH FACTORY WASTE EFFLUENTS,
Agricultural Research Service, Philadelphia, Pa. Eastern Utilities Research and Development Div.
W. L. Porter, J. Siciliano, S. Krulick, and E. G. Heisler.
In: Membrane Science and Technology; Proceedings of Symposium held at the Columbus Laboratories of Battelle Memorial Institute, October 20-21, 1969, Columbus, Ohio: Plenum Press, New York, N.Y., p 220-230, 1970 (second printing 1973). 3 fig, 5 tab, 6 ref.

Descriptors: *Waste water treatment, *Membrane processes, *Reverse osmosis, *Potatoes, *Food processing industry, Proteins, Water reuse, Byproducts.

Secondary wastes from potato-starch processing can be treated by reverse osmosis. This material contains protein, free amino acids, organic acids, sugars, inorganic ions, and other compounds. The output of this waste from a 30-ton-per-day starch plant is about 300 gpm or about 432,000 gallons per day. The solids content is about 0.5 to 1.0 percent, and it has a COD requirement of approximately 9000-14000 mg per liter. This is equivalent to a city of approximately 85,000 people, with respect to waste-disposal potential. The proteins and amino acids have been shown to contain more than adequate amounts of lysine and methionine for human and animal nutrition and, as such, have considerable value as additives to grain products. In a pilot test, the recovered water was pure enough for reuse. The best choice of the three types of membranes tested was the one of medium porosity. This conclusion was based upon the relationships between flux, retention of desirable waste-water constituents, and reduction of COD. (See also W74-09633) (Knapp-USGS)
W74-09637

URBANIZED AREAS SERVED BY SEWERS AND SEPTIC TANKS IN THE SEATTLE-TACOMA URBAN COMPLEX AND ADJACENT AREAS, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 7C.
W74-09639

OPTIMAL CONTROL OF FLOW IN COMBINED SEWER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
P. W. W. Bell.
Available from the National Technical Information Service as PB-233 668, $6.50 in paper copy, $1.45 in microfiche. Partial Completion Report, Metropolitan Water Intelligence Systems, Technical Report No 12, May, 1974. 232 p, 40 fig, 21 tab, 30 ref, 6 append. OWRR C-4172(No 9028)(1).

Descriptors: *Control systems, *Sewers, *Storm runoff, *Overflow, *Optimization, Water pollution control, Operations research, Storage, Detention, Reservoir operation, Mathematical models, Algorithms, Computer applications, Systems engineering, Automatic control, Nonlinear systems.
Identifiers: *Combined sewer systems, *Mathematical programming, Optimal control theory, Nonlinear programming.

The development of a suitable control logic for the real time control of flow in combined sewer systems is examined. The approach followed is based on continuous time optimal control theory. The combined sewer system is modelled as a series of interconnected reservoirs having both weir and orifice controls. The objective function chosen is that of minimizing weighted flow diversions from the system. The problem of numerical solution of the necessary conditions is examined and it is concluded that in general their solution is too cumbersome for practical use. An alternative control solution is proposed, based on operating rules derived from the common factors shown to exist in the previously examined solution forms. Results of application of this technique to systems of four reservoirs and ten reservoirs are presented. A further example is presented showing the effects of information errors on the true optimality of a computed control strategy. Finally, the necessary modifications to the necessary conditions for an optimal control in which there are time delays in the flow routing are presented. It appears that the approach outlined is a feasible solution to the problem of real time control of flow in combined sewers.
W74-09652

WASTEWATER RECLAMATION: SOCIO-ECONOMICS, TECHNOLOGY, AND PUBLIC ACCEPTANCE.
Ralph Stone and Company, Inc., Los Angeles, California.
Available from the National Technical Information Service as PB-233 675, $6.00 in paper copy, $1.45 in microfiche. Completion Report, May 1974. 302 p, 21 fig, 98 tab, 90 ref, 7 append. OWRR C-4030(No 9007)(1).

Descriptors: Reclamation, *Attitudes, *Economic feasibility, *Waste water treatment, Public health, *California, *Water reuse.
Identifiers: *Burbank(Calif).

The social, economic, technical and attitudinal aspects of wastewater reclamation were examined for various consumptive uses. Attitudes surveys of 100 randomly-selected residents in each of ten Southern California communities revealed consumer acceptance for non-body contact uses, neutral to accepting attitudes towards body contact uses, and neutral to rejecting attitudes for direct human consumption uses. The strongest public objection to wastewater reuse was psychological repugnance; other correlations of public attitudes were examined. Surveys of water resources public officials and experts and industrial management revealed attitudes towards reuse generally similar to the public's; officials tended to grossly overestimate public rejection of wastewater reclamation. Public health, water quality and other technical aspects of reclaiming wastewater were evaluated. Recommended treatment processes for various reuses were given. A cost-benefit model was presented for determining the overall socio-economic feasibility of reclaiming wastewater for a variety of alternative uses, taking into account differing local constraints likely to be encountered. The model was applied to the City of Burbank, California as a case study.
W74-09662

WASTE MANAGEMENT RESEARCH.
Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York. Graphics Management Corporation, Washington, D.C. (1972). 580 p.

Descriptors: *Farm wastes, *Waste disposal, Agriculture, Environment, Pollutants, *Waste treatment, *Waste storage, Legal aspects, *Regulations, Cattle, *Feed lots, Poultry, Hogs,

Agricultural runoff, Recycling, Pollution abatement.
Identifiers: *Waste management, Composting, Refeeding wastes, Pyrolysis.

Forty-nine papers were presented at the 1972 Cornell Waste Management Conference. These papers present varied aspects of waste management including: (1) legal and legislative regulations, (2) problems and alternatives for handling, treatment, and disposal systems for dairy, hog, beef, and poultry wastes, (3) water quality, and (4) utilization of wastes as a feed source. (See W74-09664 thru W74-09709) (Marquard-East Central)
W74-09663

AGRICULTURE IN THE ENVIRONMENT,
Environmental Protection Agency, Washington, D.C.
J. L. Buckley.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 1-7, (1972).

Descriptors: *Agriculture, *Environment, *Farm wastes, *Air pollution, *Water pollution, *Soil contamination, Industrial wastes, Municipal wastes, Feed lots, Research and development.

This symposium paper called for two basic accomplishments: (1) to find ways to halt agricultural pollution, and (2) to find uses for agricultural wastes. Agricultural pollution was defined, and the EPA's role in eliminating it discussed. (See also W74-09663) (Lynch-East Central)
W74-09664

ECONOMIC IMPACT OF AGRICULTURAL POLLUTION CONTROL PROGRAMS,
Federal Reserve Bank of Kansas City, Mo.
For primary bibliographic entry see Field 5G.
W74-09665

PUBLIC RELATIONS ASPECTS OF AGRICULTURAL WASTE MANAGEMENT,
For primary bibliographic entry see Field 5G.
W74-09666

IMPLICATIONS OF THE PERMIT PROGRAM IN THE POULTRY AND ANIMAL FEEDING INDUSTRY,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 5G.
W74-09667

APPLICATION OF IOWA'S WATER POLLUTION CONTROL LAW TO LIVESTOCK OPERATIONS,
Iowa State Dept. of Health, Des Moines.
For primary bibliographic entry see Field 5G.
W74-09668

A REVIEW OF PUBLIC AND PRIVATE LIVESTOCK WASTE REGULATIONS,
Missouri Univ., Columbia.
For primary bibliographic entry see Field 5G.
W74-09669

IMPLICATIONS OF STATE ENVIRONMENTAL LEGISLATION ON LIVESTOCK WASTE MANAGEMENT,
Economic Research Service, Washington, D.C. Farm Production Economics Div.
For primary bibliographic entry see Field 5G.
W74-09670

POTENTIAL CITIZEN INITIATED LEGAL ACTION AGAINST AGRICULTURAL POLLUTION,
West Virginia Univ., Morgantown. Div. of Resource Management.
For primary bibliographic entry see Field 5G.
W74-09671

DAIRY FARMER CONCERNS OF LAWS AND REGULATIONS AFFECTING ANIMAL WASTE MANAGEMENT,
National Milk Producers Federation, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-09672

PYROLYSIS AS A METHOD OF DISPOSAL OF CATTLE FEEDLOT WASTES,
Midwest Research Inst., Kansas City, Mo.
W. Garner, C. E. Bricker, T. L. Ferguson, C. J. W. Wiegand, and A. D. McElroy.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 101-123 (1972). 7 fig, 5 tab, 10 ref.

Descriptors: *Farm wastes, *Waste disposal, *Feed lots, *Cattle, *Cost analysis, Cellulose, Lignin, Differential thermal analysis.
Identifiers: *Pyrolysis, Hemicellulose, Thermogravimetric analysis, Organic fractions.

A program was conducted to determine the economic feasibility of pyrolyzing feedlot wastes. Background theory on pyrolysis of cellulose, hemicellulose and lignin, and wood is given. The pyrolysis process is described and test results are given. Composition of noncondensables, elemental analyses, material and energy balance, and economic evaluation of a pyrolyzer for manure from a 40,000 head beef cattle feedlot are given. The conclusion was that pyrolysis of feedlot wastes was uneconomical in relation to simple incineration because cost of equipment to separate potential marketable material was not offset by the market value of the materials. (See also W74-09663) (Marquard-East Central)
W74-09673

DAIRY MANURE WASTE HANDLING SYSTEMS,
A. Grimm.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 125-144 (1972). 1 fig, 3 tab, 7 ref.

Descriptors: *Dairy industry, *Waste disposal, *Waste treatment, Aeration, Activated sludge, Incineration, Cattle, *California, *Farm wastes.
Identifiers: Dairy manure, *Waste handling systems, Centralized dairies, Decentralized dairies, Dirt corrals, Paved corrals, Direct disposal, Dewater solids, Compost, Liquid flush, Oxidation ditch, Dairymen's Fertilizer Cooperative, Pyrolysis, Southern California, Cerritos, California.

Because of complete urbanization of such areas as Cerritos, California, a program was initiated in southern California to study and demonstrate improved methods of handling raw manures at individual dairies and feedlots in highly populated areas. Individual systems costs are presented. Evaluations were made for ten decentralized individual dairy waste handling systems: Four for a dirt corral dairy and six for a paved corral dairy. Eight centralized, regional dairy waste handling systems were analyzed. A comparison is presented of environmental effects of waste handling systems and system operating cost. Conclusions were: (1) disposal of manure from each decentralized dairy should be accomplished in the most economical manner with the least detrimental environmental effect, and (2) in view of a diminishing number of dairies, construction and operation of a centralized waste disposal plant did not appear justified in the Cerritos area. (See also W74-09663) (Marquard-East Central)
W74-09674

AERATION RATES FOR RAPID COMPOSTING OF DAIRY MANURE,
G. B. Willson, and J. W. Hummel.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 145-158 (1972). 12 fig, 2 tab, 9 ref.

Descriptors: *Dairy industry, *Farm wastes, Chemical oxygen demand, Nitrates, Ammonia, *Waste treatment, *Aeration.
Identifiers: *Composting, Aeration rates, Bench composter, Bin composter, Mechanized channel, Oxygen consumption rate.

Studies were undertaken to develop design criteria for composting operations. Bench composters, bin composters, and a mechanized channel were the three methods used for development of aeration rates. A generalized curve was developed showing the effects of aeration on temperature and rate of oxygen consumption at any one time during the process. Aeration rates should vary in the process in the following sequence: (1) during warmup stage, aeration should be applied at increasing rates; (2) when thermophilic temperature is reached the aeration rate should be increased to the top of the temperature limit; and (3) as the level of activity decreases the rate of aeration should be reduced to prevent cooling. (See also W74-09663) (Marquard-East Central)
W74-09675

WINDROW COMPOSTING OF SWINE WASTES,
Cornell Univ., Ithaca, N.Y.
J. H. Martin, Jr., M. Decker, Jr., and K. C. Das.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 159-172 (1972). 10 fig, 5 tab, 7 ref.

Descriptors: *Hogs, *Waste treatment, Hydrogen ion concentration, *Farm wastes.
Identifiers: *Composting, *Swine wastes, Windrow, Thermophilic environment, Adulteration.

A study was performed to determine the feasibility of composting swine wastes. Criteria for evaluation were control of odors, time required for stabilization, volume reduction, and characteristics of the end product. Evaluation of the composting process was accomplished in two phases: (1) windrow formation creating aerobic conditions conducive to thermophilic activity and (2) maintenance of conditions for rapid stabilization. The findings were: (1) a direct correlation was observed between odor control and development of thermophilic environment; (2) increasing the turning frequency had a significant effect on the composting process; (3) adulteration of the material was successful in reducing the time before odors were controlled and minimizing time for completion when straw was used; (4) volume reduction and final material were satisfactory, and (5) composting can be a satisfactory method for treating swine manure and provides an alternative to liquid systems. (See also W74-09663) (Marquard-East Central)
W74-09676

REDUCTION IN MOISTURE AND DAILY REMOVAL OF WASTES FROM CAGED LAYING HENS,
West Virginia Univ., Morgantown.
A. D. Longhouse.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 173-185 (1972). 9 fig, 6 tab.

Descriptors: *Poultry, *Farm wastes, *Waste disposal, Ammonia, *Waste treatment, Odor, Forced drying.
Identifiers: Caged laying hens, Moisture reduction, Vertically tiered cages, Dryer conveyor, Dropping boards, Scraper.

Research objectives were to remove manure daily from laying hens in vertically tiered cages and to begin moisture removal promptly, thus preventing odor development (especially of ammonia) and restricting vectors. The research facility was equipped with a dryer-conveyor, dropping boards, a scraper mechanism, and an automatic control for solenoid steam valve. Construction design is illustrated. Results of a five-day test are tabulated. The research, at this time, indicates that it is possible to eliminate odors and flies in a poultry house when the manure is removed at least once daily, thus making it possible to increase the bird population 25 to 100 percent - thereby paying for added mechanization. (See also W74-09663) (Marquard-East Central)
W74-09677

UNDERCAGE DRYING OF LAYING HEN MANURE,
Cornell Univ., Ithaca, N.Y.
A. T. Sobel.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 187-200 (1972). 12 fig, 2 tab, 3 ref.

Descriptors: *Forced drying, *Farm wastes, *Poultry, Attractants, *Waste disposal, Odor, Particle size, Particle shape, Temperature, *Waste treatment.
Identifiers: Undercage drying, Laying hen manure, Fins, Screens, Slot outlets, Air velocity, High-rise laying house, Bird concentration.

Two systems for undercage drying of chicken manure were investigated. The first system employed mechanical devices and no forced air. Test results indicated metal fins placed at angles beneath cages offer more efficient drying than mesh screen. Percentage results of various angles are listed. The second system utilized forced air drying in bird rooms with slot outlets and a high rise laying house. This was the only system studied on a full size field operation. An average drying curve for undercage drying with forced air and slot outlets and a summary of moisture contents obtained for various undercage drying systems are presented. Observations indicate (1) the high-rise house presented the largest range of moisture contents, (2) shallow bed system (forced air) presented the smallest range of moisture, and (3) all systems removed moisture to moisture contents below 60 percent. (See also W74-09663) (Marquard-East Central)
W74-09678

STORAGE OF MANURE SOLIDS BY FORMING SOIL-MANURE PELLETS,
Iowa State Univ., Ames.
R. D. Larson, T. E. Hazen, and J. R. Miner.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 201-210 (1972). 5 fig, 5 tab, 5 ref.

Descriptors: Hydraulic transportation, *Farm wastes, *Waste storage, Moisture content, Physical properties, Hydrogen ion concentration, Nitrogen, Carbon dioxide, Ammonia, *Waste treatment, Dewatering.
Identifiers: *Soil-manure pellets, Hydrated lime, Webster silty clay loam, Volitalization.

Moisture content, pH effects and nitrogen/CO2 evolution in the pelleting process of animal manure are described. Soil and lime are added to manure solids to help produce pellets. Soil is used as a dewatering and binding agent to control moisture content and lime is used to increase pH. Nitrogen/CO2 evolution is tested by 5 and 10% lime treatments. Conclusions are: (1) Addition of lime increases ammonia loss from a soil, lime and manure mixture; the rate of evolution increases significantly above pH 11. Moisture content does not greatly effect rate of evolution. (2) Biological activity, represented by carbon volatilization increases with the addition of 2.5% d.b. hydrated lime. Further lime additions decrease activity. At the 10% lime level, growth is arrested. Little or no growth occurs above pH 9. In most treatments, moisture-content increases were accompanied by marginal increases in carbon-dioxide evolution. (3) Manure solids exhibit a buffering capacity. The solids have an ability to retard pH increases with increasing lime contents. A pH range from 9 to 11 would be desirable in order to mutually minimize ammonia and carbon evolution. (See also W74-09663) (Marquard-East Central)
W74-09679

CHEMICAL STUDIES OF SOLIDS, RUNOFF, SOIL PROFILE AND GROUNDWATER FROM BEEF CATTLE FEEDLOTS AT MEAD, NEBRASKA,
For primary bibliographic entry see Field 5B.
W74-09680

BEEF BARNLOT RUNOFF AND STREAM WATER QUALITY,
Ohio Agricultural Research and Development Center, Worster.
For primary bibliographic entry see Field 5B.
W74-09681

AUTOMATED HYDRAULIC WASTE-HANDLING SYSTEM FOR A 700-HEAD SWINE FACILITY USING RECIRCULATED WATER,
Iowa State Univ., Ames.
J. K. Koelliker, J. R. Miner, T. E. Hazen, H. L. Person, and R. J. Smith.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 249-261 (1972). 8 fig, 1 tab, 6 ref.

Descriptors: *Hogs, *Recirculated water, *Farm wastes, *Waste storage, *Waste disposal, Irrigation, Estimated costs, *Iowa, *Waste water treatment, Water reuse.
Identifiers: Automated hydraulic waste-handling system, Flush tanks, Sewer lines, Anaerobic lagoon, Return water system, Slatted floors.

A swine waste handling system is described that for four years has operated with little attention, no handling of manure, low odors, and no effluent discharge into streams. The system uses an enclosed building in which swine waste is deposited into gutters. Flush tanks automatically flush the water into sewer lines and then to an anaerobic lagoon. From here some waste goes into the irrigation system for land disposal and lagoon effluent is returned to the flush tanks. Investment in the entire manure management system is estimated at $10-$15 per hog capacity. Detailed description and costs of the system are given. (See also W74-09663) (Marquard-East Central)
W74-09682

OPERATIONAL PROBLEMS OF PORK PRODUCTION RELATED TO ENVIRONMENTAL QUALITY,
A. E. Gehlbach.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 263-265 (1972).

Descriptors: *Hogs, *Farm wastes, *Waste disposal, Confinement pens, Oxidation lagoons, Lagoons, *Waste water treatment.
Identifiers: *Environmental quality, Operational problems, *Soil injection, Pasture system, Collection pits.

A comparison is made of two pork production systems - the pasture system and the confinement system. An operational problem of the pasture system is that heavy rains wash runoff into streams. The confinement system can prevent this and can dispose of waste in these ways: (1) collection pits, (2) oxidation ditches, (3) lagoons. Problems of these are costs and inability to use them year round. Gehlbach Swine Farms uses soil injection to prevent runoff and odor; however, research is needed to solve these waste disposal problems: (1) find limits of animal waste applications to land, (2) prevent odor from swine buildings and (3) find proper operating procedures for lagoons. (See also W74-09663) (Marquard-East Central)
W74-09683

TREATMENT OF SWINE WASTES,
L. R. Schuster.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 267-270 (1972).

Descriptors: *Hogs, *Farm wastes, *Waste treatment, Confinement pens, Poultry, Biochemical oxygen demand, Costs, *Aeration.
Identifiers: Tank-aerator.

The swine aerator system was chosen as a means of waste treatment for the following reasons: (1) Closed loop with zero runoff, (2) Adaptability to existing facility, (3) Ready accessibility for maintenance, (4) Ease of operations. Tank design and aeration rates are given for a 100 sow operation. Water area of the system is 18x38x10 ft. Waste containing a five day biochemical oxygen demand of 33,000 mg/l and an oxygen uptake rate of 43 mg/l/hr. requires transfer of 21.5 lbs of oxygen per hour at 20 degrees centigrade. Pumps must be capable of pumping at least 635,000 gal/hr., or the equivalent of turning over the tanks content once every 4.7 minutes. Costs and savings through use of such a system are discussed. (See also W74-09663) (Marquard-East Central)
W74-09684

AN EVALUATION OF THREE HYDRAULIC MANURE TRANSPORT TREATMENT SYSTEMS, INCLUDING A ROTATING BIOLOGICAL CONTACTOR, LAGOONS AND SURFACE AERATORS,
Iowa State Univ., Ames.
H. L. Person, and J. R. Miner.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 271-288 (1972). 5 fig, 9 tab, 1 ref.

Descriptors: *Hogs, *Farm wastes, *Waste treatment, *Waste water treatment, Lagoons, Confinement pens, Nitrogen, Ammonia, Rotating biological contactor, Chemical oxygen demand, Biochemical oxygen demand, Effluent, Iowa.
Identifiers: *Hydraulic manure transport systems, Anaerobic lagoon, Aeration basin, Recycled water, Flushing gutters, Surface aerators, Bilsland Memorial Research Station.

Three different waste treatment systems that use flushing gutters and recycled treated waste waters for cleaning are reported. System 1 uses flushing gutters and an aeration basin; system 2 uses flushing gutters, an anaerobic lagoon and an aeration basin; and system 3 uses flushing gutters, an anaerobic lagoon and a rotating biological contactor. Each system is diagramed and specific details and dimensions are given. Effectiveness of the three systems in terms of effluent control is summarized. It was found that (1) discharging effluent down flushing gutters was an effective means of removing manure from swine buildings, (2) treated effleunt did not inhibit normal swine growth, (3) recycled wastes did not cause excessive odor problems, (4) the effluent from the RBC system and lagoon, aeration-basin system presented a few

pumping problems, and (5) the aeration-basin effluent contained more solids and had clogged return lines more frequently. (See also W74-09663) (Marquard-East Central)
W74-09685

DRYING POULTRY MANURE AND REFEEDING THE END PRODUCT,
J. F. Bergdoll.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 289-293 (1972).

Descriptors: *Poultry, *Farm wastes, *Recycling, Nitrogen, Costs, Nutrients, Odor, Fertilizers, *Indiana, *Drying, *Waste treatment.
Identifiers: Refeeding, Dried poultry manure.

Berry Best Egg Company's program for drying poultry manure into a feed is reported. The manure is dried to a 10-15% moisture content. No odor is reported when 10% level is reached; however, from the 12-15% moisture level, there is a slight smell. Cost for a dryer runs from $22,000 to $70,000 and total operational costs run from $15 to $35 per ton. Nutrient Value/Nitrogen is highest when manure is dried daily. Optimum level for waste in a feed ration is 10 to 15%; however, it is recommended that birds should start eating a ration at eight weeks of age and work up to a 30% level. Egg production results are given. (See also W74-09663) (Marquard-East Central)
W74-09686

THE EFFECTS OF CONTINUOUS RECYCLING AND STORAGE ON NUTRIENT QUALITY OF DEHYDRATED POULTRY WASTE (DPW),
Michigan State Univ., East Lansing.
C. J. Flegal, C. C. Sheppard, and D. A. Dorn.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 295-300 (1972). 5 tab, 5 ref.

Descriptors: *Poultry, *Farm wastes, *Waste storage, *Nutrients, Calcium, Phosphorus, Nitrogen, *Recycling, *Waste treatment.
Identifiers: Continuous recycling, Dehydrated poultry wastes, Crude protein.

One experiment was conducted to determine the influence of poultry waste storage time on the nutrient quality of dried poultry wastes. Another experiment tested what continuous recycling does to dried poultry waste nutrient quality. In the first experiment, droppings were collected and stored prior to drying from periods ranging from 1 to 90 days. In general, when the material was held for longer than 28 days, crude protein content went down. In experiment 2, pullets were fed rations for 412 days. The diets containing DPW were continuously recycled. At the completion of 31 cycles, the proximate analyses of the DPW from the birds fed the continually recycled DPW were quite similar to prior results. However, both calcium and phosphorus were slightly higher than DPW from hens fed a standard cage laying ration. Hen housed egg production of the birds fed the 12.5 percent DPW diet was slightly higher than the hen housed egg production of the other birds. Birds fed the diet containing 25 percent DPW consumed the most feed. Mortality of the birds fed the three diets ranged from 6.9 percent to 7.9 percent. (See also W74-09663) (Marquard-East Central)
W74-09687

EVALUATION OF DEHYDRATED POULTRY MANURE AS A POTENTIAL POULTRY FEED INGREDIENT,
Cornell Univ., Ithaca, N.Y.
M. C. Nesheim.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 301-309 (1972). 7 tab, 6 ref.

Descriptors: *Poultry, *Farm wastes, *Feeds, *Recycling, Evaluation, Economics, Amino acids, Phosphorus, *Waste treatment.
Identifiers: Refeeding, Dehydrated poultry manure, Metabolizable energy, Egg production, Feed consumption.

Experiments were made to evaluate poultry waste as a poultry feed ingredient. The metabolizable energy content of the poultry waste was considered the best single overall measure of its potential value as a feed ingredient. Test hens were fed computer formulated rations of which diets 1, 2, and 4 were of low energy content while diet 3 was a typical commercial energy diet. Diets 1 and 4 had 22.5% poultry waste as an ingredient of their rations. Results revealed that egg production was high for all four diets; however, hens on diets 1, 2, and 4 ate more than those on diet 3. There was also a marked increase in excreta dry matter for these hens. This indicated that only a portion of the manure was actually lost in recycling. The computer analysis indicated that poultry waste would be used as a preferred source of phosphorus in the ration until it reached a cost of $26.00 a ton with the feed ingredients used. Its high phosphorus content along with the associated amino acids and energy made it a preferred source of phosphorus in the ration compared to meat meal and decalcium phosphate. (See also W74-09663) (Marquard-East Central)
W74-09688

OPERATIONAL PROBLEMS OF POULTRY PRODUCTION RELATED TO ENVIRONMENTAL QUALITY,
H. J. Kreher.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 311-316 (1972).

Descriptors: *Waste disposal, *Poultry, *Air pollution, *Odor, *Legal aspects, Technology, Ozone, *New York, *Waste water treatment.
Identifiers: Operational problems, Environmental quality, Liquid manure spreader, Soil injection.

Waste disposal is the main operational problem of Kreher Poultry Farms, a 60,000 hen poultry farm in New York. When land disposal of liquid manure became objectionable to a nearby population, ozone treatment was used to reduce odors. Due to maintenance breakdowns, the odors persisted and the farm owners were taken to court. The owners were faced with a $200 settlement for their violations. These owners feel that this was an unfair judgement and that there is a desperate need for an objective third party - an agriculture industry panel made up of people acquainted with agricultural problems and agricultural research. Such a council could give sound recommendations to farmers in trouble. (See also W74-09663) (Marquard-East Central)
W74-09689

AUTOMATED HANDLING AND TREATMENT OF SWINE WASTES,
Ohio State Univ., Columbus.
E. P. Taiganides, and R. K. White.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 331-339 (1972). 12 fig.

Descriptors: *Hogs, *Farm wastes, *Waste water treatment, *Oxidation lagoons, Odor, Automation.
Identifiers: *Automated handling, Flushing gutters, Recycled waste water, Siphon tanks.

A plant was constructed on Botkins Feed and Grain Company Research Farm, Botkins, Ohio, in order to study the feasibility of automatically removing swine wastes, treating them, and recycling treated effluent back to the building to flush out further wastes. The plant operated as follows. A tank located at the end of the gutter was filled with water which was siphoned onto the gutter. The flushing water carried the dung defecated on the gutter to a sump from where the waste water was pumped onto a stainless steel screen. At the screen, the solids were separated from the liquids. Liquids were discharged into the oxidation ditch, clarified, and the supernatant from the final clarifier was pumped back into the siphon tanks in the animal building. Meanwhile the solids separated by the screen were aerobically digested, stored, and pumped on crop land. After twenty weeks of operation the automated removal of waste was working extremely well and odor control was good, but the oxidation ditch was malfunctioning and foaming. At the time of this report, it was hoped that the system would be monitored two more years and that procedures would be developed to make the plant operate optimally at all times. (See also W74-09663) (Marquard-East Central)
W74-09690

EVALUATION OF SWINE WASTE TREATMENT ALTERNATIVES,
North Carolina State Univ., Raleigh.
F. J. Humenik, R. W. Skaggs, C. R. Willey, and D. Huisingh.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 341-352, (1972). 1 fig, 11 tab, 6 ref.

Descriptors: *Hogs, *Farm wastes, *Waste water treatment, *Evaluation, *Waste disposal, Nitrogen, Chemical oxygen demand, Phosphorus, Heavy metals.
Identifiers: *Land disposal, Unaerated lagoons, Application rates, Cecil sandy loam, Norfolk sandy loam.

The treatment of swine waste by a single unaerated lagoon, the treatment of swine waste by an unaerated series lagoon system, and data for land disposal of effluent from a single unaerated lagoon are described. The experiment revealed that an unaerated series lagoon can handle twice the number of animals that a single aerated lagoon can take care of and there is no increase in odor. Specific conclusions were: (1) Major constraints in using lagoon systems in the Southeast are the disposal of excess liquid and the potential of odor and excess leakage. (2) A conservative estimate of allowable nitrogen loading when using land disposal of wastes in the Southeast appears to be 15 lb/acre/week for Cecil sandy loam and 10 lb/acre/week for Norfolk sandy loam. (3) Heavy metal feed additives can pose an environmental and health hazard, i.e. the copper content of the soil-plant disposal system may approach levels that poison the soil and/or are toxic for sheep and other animals. However, lagoons can be utilized as a copper trap prior to land disposal. (See also W74-09663) (Marquard-East Central)
W74-09691

DEVELOPMENT OF A SYSTEM AND A METHOD FOR THE TREATMENT OF RUNOFF FROM CATTLE HOLDING AREAS,
Kappe Associates, Inc., Rockville, Md.
D. S. Kappe.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 353-363, (1972). 2 fig, 2 tab.

Descriptors: *Waste water treatment, *Farm wastes, *Agricultural runoff, Waste treatment, *Waste disposal, Cattle, Dairies, *Confinement pens, Aerobic treatment, Anaerobic conditions, Sludge, Hydrogen ion concentration, Chemical properties, Economics, Maryland.
Identifiers: *Waste management research, *Aeration tank.

Kappe Associates Inc. and J. L. Mills Brooklawn Dairy Farm have completed construction of a

dairy farm wastes treatment system. A description is given of the project site, the experimental treatment system, and the studies that are to be made. The treatment system consists of a concrete flow metering box; an aerated grit chamber; a dual section aeration tank with a hopper bottom; a chlorine contact tank, a pump and piping system that enable treated and chlorinated wastewater to be used for washing down the treatment facility and flushing the holding area; a small building, which houses two blowers for supplying air to the aeration tank, the chlorinator for the facility, the treatment system electrical control panel; an air flow meter for measuring the air flow to the aeration tanks; a wastewater flow recorder; other mechanical equipment; and the project site laboratory. The system was designed essentially to utilize the extended aeration modification of the activated sludge waste treatment process and to operate on a 'fill-and-draw' basis. The treatment methods to be studied were based on biological processes or combination of biological processes. (See also W74-09663) (Marquard-East Central)
W74-09692

EVALUATION OF BEEF WASTE MANAGEMENT ALTERNATIVES,
Oklahoma State Univ., Stillwater.
A. R. Butchbaker, J. E. Garton, G. W. A. Mahoney, and M. D. Paine.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 365-384, (1972). 7 fig, 6 tab, 21 ref.

Descriptors: *Cattle, *Farm wastes, *Waste water treatment, *Waste disposal, *Waste storage, Climates, Slurries, Costs, Agricultural runoff, Solid wastes, Farm lagoons, Legal aspects.
Identifiers: *Waste management alternatives, *Confinement buildings, Open feedlots, Site selection.

Waste management design alternatives are outlined for both open and housed feedlot feeding facilities. Among the major conclusions are: (1) No treatment system for liquid feedlot wastes produces an effluent suitable for discharge to a stream. (2) Areas where moisture deficit is greater than 10 inches have high potential for using evaporation for ultimate disposal of liquid wastes. (3) Paving open feedlots reduces pen surface area and runoff control structure sizes to about one-third of the area and sizes required for unpaved feedlots. (4) Confinement buildings offer a high potential for pollution control. Capital costs are higher than for open feedlots, but land areas are reduced, rainfall runoff structures are unnecessary and wastes may be removed either as a semi-solid or as a slurry. (5) A slurry hauling system utilizing soil injection for handling liquid wastes from storage pits provides an optimum system for abatement of odors and water pollution, but is more expensive and slower than surface spreading. (6) A manure irrigation system for pumping a slurry or wastewater for field application costs about one-half as much as mechanically hauling and spreading a slurry within one-half mile of the feeding facilities. (7) Ultimate disposal of feedlot waste on agricultural land should be encouraged. (See also W74-09663) (Marquard-East Central)
W74-09693

CHARACTERISTICS OF WASTES FROM SOUTHWEST BEEF CATTLE FEEDLOTS,
Texas Tech Univ., Lubbock.
D. M. Wells, G. F. Meenaghan, R. C. Albin, E. A. Coleman, and W. Grub.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 385-404, (1972). 5 fig, 17 tab.

Descriptors: *Feed lots, *Farm wastes, *Southwest U.S., *Waste water treatment, *Waste disposal, Feeds, Slopes, Semiarid climates, Texas.
Identifiers: *Concrete-surfaced feedlots, *Dirt-surfaced feedlots, Waste characteristics, Composting.

Studies conducted on concrete-surfaced feedlots and on dirt-surfaced feedlots with varying degrees of slope yielded the following conclusions: (1) Pollutant concentrations of runoff are in a range of one to more than two orders of magnitude higher than concentrations found in untreated municipal sewage. (2) Treatment of runoff from Southwestern cattle feedlots is infeasible. (3) Concentrations of pollutants in runoff resulting from precipitation on concrete-surfaced lots are two to four times greater than corresponding concentrations from dirt-surfaced lots. (4) The quantity of solid waste accumulating on the feedlot floor is a direct function of the fraction of roughage in the finishing ration. (5) The fraction of incident precipitation running off concrete lots is twice the fraction running off dirt-surfaced lots. (6) Stocking rates above 40 square feet per animal on concrete lots do not enhance animal performance. (7) Limited feeding trials utilizing a roof to eliminate runoff had no effect on cattle performance. (8) Increasing slope of concrete feedlots from 7 1/2 to 15 percent makes lots virtually self-cleaning. (9) Aerobic composting of solid wastes is technologically feasible regardless of the type of operation. (10) Extreme caution must be exercised in application of feedlot runoff to agricultural crops. (See also W74-09663) (Marquard-East Central)
W74-09694

INITIAL OBSERVATIONS OF SEVERAL MEDIUM SIZED BARRIERED LANDSCAPE WATER RENOVATION SYSTEMS FOR ANIMAL WASTES,
Michigan State Univ., East Lansing.
A. E. Erickson, J. M. Tiedje, B. G. Ellis, and C. M. Hansen.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 405-410, (1972). 1 fig, 2 tab, 2 ref.

Descriptors: *Waste water treatment, *Waste disposal, *Farm wastes, *Water pollution, *Soil contamination, *Nitrogen, *Phosphorus, Denitrification, Carbon, Livestock, Hogs, Nitrates, Effluent, Aquifer.
Identifiers: Barriered Landscape Water Renovation System(BLWRS).

Adsorption and filtering action of soils can be used to renovate waste water, but the expense of land and its management as well as land availability in many places has forced the intensive spreading of wastes on limited acreages with the possible pollution of water resources. Because there is a need for a method of renovation which is more efficient, doesn't require such large land areas, and is not as expensive as conventional sewage treatment and disposal, BLWRS (Barriered Landscape Water Renovation System) has been developed. It consists of a limestone or slag covered mound of soil underlain by an impervious water barrier. BLWRS's method is relatively inexpensive to construct, requires a minimum of maintenance, requires a smaller area than is needed for irrigation spreading systems, and removes large amounts of the nitrogen, carbon and most of the phosphate from the local environment. Tests are too incomplete for BLWRS's to be used commercially, but so far its nitrogen and phosphate removal capability has been as high as 99% for animal wastes. (See also W74-09663) (Marquard-East Central)
W74-09695

REMOVAL OF PHOSPHORUS FROM LIQUID ANIMAL MANURE WASTES,
Cornell Univ., Ithaca, N.Y.
R. C. Loehr.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 411-427, (1972). 4 fig, 2 tab, 4 ref.

Descriptors: *Farm wastes, *Liquid wastes, *Phosphorus, *Waste water treatment, *Waste disposal, Alum, Hydrogen ion concentration, Poultry, Ducks(Domestic), Cattle, *New York.
Identifiers: Chemical removal, Alum, Ferric chloride.

Results are presented of detailed laboratory studies to remove phosphorus from duck, poultry, and dairy manure wastewaters and the feasibility of such removal is discussed. The studies investigated the effect of phosphorus concentrations, pH control, different coagulants and wastewater source. The three chemicals used in the phosphorus removal experiments were: alum - AL2(SO4)3; lime - CaO; and ferric chloride - FeCL36H2O. Actual comparison of the three chemicals was difficult since they were used in wastewaters of different characteristics and chemical demand. Chemical choice was determined by required dosage, chemical cost, and the costs of ultimate solids disposal. The alum requirements were less than those of lime for most poultry manure wastewaters; lime requirements were less for duck wastewater. Controlled land disposal should be considered a high priority method for phosphorus control from animal wastewaters because it is more amenable to normal animal production operations, avoids the need for chemical control and treatment plant operation, and eliminates additional problems of chemical costs and sludge production handling and disposal. (See also W74-09663) (Marquard-East Central)
W74-09696

CONTRIBUTION OF ANIMAL WASTE TO NITRATE NITROGEN IN SOIL,
Pennsylvania State Univ., University Park.
For primary bibliographic entry see Field 5B.
W74-09697

HEAVY MANURE APPLICATIONS: BENEFIT OR WASTE,
Massachusetts Univ., Amherst. Dept. of Plant and Soil Sciences.
M. E. Weeks, M. E. Hill, S. Karczmarczyk, and A. Blackmer.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 441-447, (1972). 6 tab, 4 ref.

Descriptors: *Farm wastes, *Waste disposal, *Rates of application, Nitrogen, Phosphorus, Salts, Connecticut, Massachusetts, *Corn(Field), *Waste treatment, Nitrates.
Identifiers: Agawam sandy loam, Hadley sandy loam, Chlorides.

A study was started to determine the effects of high rates of manure on the growth and yield of corn crops and on chemical and physical change in light textured soils. Three experimental sites with sandy loam soils were used. After two years of experimenting, the following was revealed: (1) Large manure applications on well-drained sandy loam soils should not adversely affect crop growth or yield. (2) Manure applications have a favorable effect on general tilth and workability of soil. (3) Nitrates, chlorides and other salts move through the soil profile at all levels of application, though during the growing season a crop of corn would utilize much of the nutrients as they become available, probably as high as 42 tons per acre. (4) Leaching would occur mainly before the crop is established and after it is removed. (5) Annual applications of manure for purposes of disposal on crop land should be made only after due consideration is given to location and total amount of area covered. The crops themselves were not analyzed for nitrate content. (See also W74-09663) (Marquard-East Central)
W74-09698

EFFECTS OF SOLID BEEF FEEDLOT WASTES ON SOIL CONDITIONS AND PLANT GROWTH,
Kansas State Univ., Manhattan.
L. S. Murphy, G. W. Wallingford, W. L. Powers, and H. L. Manges.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 449-464, (1972). 15 fig, 2 tab, 12 ref.

Descriptors: *Feed lots, *Farm wastes, *Waste disposal, *Nitrogen, *Nitrates, *Phosphorus, Rates of application, Nutrient removal, Plant growth, Soil chemical properties, Ions, Sodium, Potassium, Cattle, *Kansas, Waste treatment.
Identifiers: Electrical conductivity, Saturation extract conductivity, Greensburg silty clay loam, Silage yields.

Results of a two-year study indicate that large applications of solid beef feedlot manure can depress yields of corn silage. Silage yields were found to have a quadratic relationship to manure applications. Maximum yields were realized between 225 and 300 MT/ha. Depressed yields were due to accumulation of salts from manures. Electrical conductivity of the soil saturation extract increased linearly with manure applications. Sodium, potassium, phosphorus, NO3 -N and nitrogen were found in large quantities in the soil; however, NO3 N and nitrogen was not in large quantities of the corn silage, while phosphorus was. Results suggest that the detrimental effects of excessive manure application may be reversed by continued cropping and adequate water penetration of the soil. (See also W74-09663) (Marquard-East Central)
W74-09699

GRASS RESPONSE TO APPLICATIONS OF BEEF-CATTLE FEEDLOT RUNOFF,
M. B. Satterwhite, and C. B. Gilbertson.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 465-480, (1972). 7 fig, 7 tab, 27 ref.

Descriptors: *Feed lots, *Agricultural runoff, Chemical analysis, *Rates of application, Grasses, Soil chemical properties, Nutrients, Soil profiles, Cattle, *Nebraska, *Waste water treatment.
Identifiers: Orchard grass, Little bluestem, Switchgrass, Reed canarygrass, Big bluestem, Intermediate wheatgrass, Brome grass, Side-oats grama, Indiangrass.

Field and greenhouse investigations were initiated to determine the response to various kinds of grasses to applications of beef feedlot runoff. Chemical aspects of the runoff, grasses tested, grass production, protein content, and soil analyses are tabulated. It was found that yearly variation in runoff could lead to differences in grass response. Response could range from increased yields to death. Under controlled greenhouse conditions, grasses in order of decreasing response were: Orchard grass, Little bluestem, Switchgrass, Reed canarygrass, Big bluestem, Intermediate Wheatgrass, Brome grass, Side-Oats grama, and Indiangrass. (See also W74-09663) (Marquard-East Central)
W74-09700

A STUDY OF CORN RESPONSE AND SOIL NITROGEN TRANSFORMATIONS UPON APPLICATION OF DIFFERENT RATES AND SOURCES OF CHICKEN MANURE,
Cornell Univ., Ithaca, N.Y.
K. MacMillan, T. W. Scott, and T. W. Bateman.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 481-494, (1972). 7 fig, 10 tab, 5 ref.

Descriptors: *Farm wastes, *Rates of application, *Nitrogen, Potassium poultry, Electrical conductance, Acidic soils, Salts, Hydrogen ion concentration, *New York, *Waste water treatment, *Corn(Field).
Identifiers: Chicken manure, Soil nitrogen transformation, Oxidation ditch manure, Diffused air manure.

A 37-day greenhouse experiment was initiated to (1) determine corn response when extremely different rates of treated manure sources were applied to two typical New York soils differing in pH and (2) determine soil nitrogen transformations under the above conditions. Raw manure was applied at rates 0, 75, 155, 310, and 620 micro gN/gm soil. All other sources (stored oxidation ditch manure, oxidation ditch manure, and diffused air manure) were applied at rates 0, 125, 250, 500, and 1000 micro gN/gm soil. It was concluded that: (1) high rates of manure applications did not result in excessive amounts of salts nor destroy the microbial population, (2) Luxury Nitrogen and potassium consumption resulted from the application of high rates of the manure sources studied, (3) In low pH soils the corn grew well; in high pH soils the effect of manure application was detrimental. This suggested that acid soils have the greatest potential for manure disposal and maximum crop efficiency. (See also W74-09663) (Marquard-East Central)
W74-09701

SURFACE RUNOFF NUTRIENT LOSSES FROM VARIOUS LAND DISPOSAL SYSTEMS FOR DAIRY MANURE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-09702

A STUDY OF FOAMING PROBLEMS IN AN OXIDATION DITCH TREATING SWINE WASTE,
Toronto Univ. (Ontario).
P. H. Jones, and N. K. Patni.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 503-515, (1972). 14 fig, 2 tab, 3 ref.

Descriptors: *Farm wastes, *Swine, *Oxidation lagoons, *Foaming, *Waste water treatment, Temperature, Hydrogen ion concentration, Suspended solids.
Identifiers: *Oxidation ditch, *Electronic foam sensor, Beloit-Passavant Rotor, Foam suppressants, Electrodes, Silicon controlled rectifier.

A study was made of the occurrence of foam and the factors affecting foam generation in a full-scale oxidation ditch used for treatment of daily wastes of approximately 400 swine. Foam formation was monitored daily for 211 days and temperature, dissolved oxygen, pH, suspended solids, etc. were measured. A rotor operated within the ditch to promote aeration. Breaking the foam with water spray proved unsatisfactory. By the 6th week, foaming was acute. The use of winter fuel oil and commercial foam depressants proved unsatisfactory. A five foot high wooden head-box was constructed downstream of the rotor to catch the foam, but proved to be not strong enough. After the winter freeze the ditch was restarted May-August, 1971. An electronic foam sensor was devised. When foam built up too much, the sensor caused the rotor to shutdown. A red warning light alerted farm personnel. 1-3 hours was allowed to let the foam subside. Then the rotor was manually restarted. The foam sensor operating in conjunction with the head-box completely eliminated foam spillovers. Little maintenance was required and the necessity of closely watching the foam was removed. (See also W74-09663) (Merryman-East Central)
W74-09703

TREATMENT AND DISPOSAL OF SWINE WASTE,
T. J. Mulligan, and J. C. Hesler.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 517-536, (1972). 8 fig, 4 tab.

Descriptors: *Waste water treatment, *Waste disposal, *Farm wastes, *Hogs, Confinement pens, Feeds, Biochemical oxygen demand, Chemical oxygen demand, Foaming, Aerated lagoons, Anaerobic conditions, Odor.
Identifiers: Swine, Refeeding.

Several treatment systems for swine wastes are reviewed. Specific studies are cited and formulas derived. Anaerobic lagoons and aerated lagoons reduce the organic contents of wastewater. Discharge of the treated settled effluent to surface waters after this type of treatment, however, is often unsatisfactory due to the nutrient content and color of the wastewater. Also, the remaining BOD, suspended solids, coliform, and salt content may be objectionable in certain receiving waters. Liquid wastewaters may be disposed of by spray irrigation or evaporation ponds. Each of these methods requires significant land area and may be accompanied by an odor problem. Wastes may be spread on the land or plowed and furrowed, but again there is a potential odor problem and large land area is required. Also, in cold climates the wastes would have to be stored until they could be deposited on the land. Wastes may be refed, but more research is needed. Many variables must be evaluated in determining ultimate treatment and disposal of animal waste. Imaginative approaches to the overall waste problem are needed. (See also W74-09663) (Merryman-East Central)
W74-09704

AEROBIC TREATMENT OF SWINE WASTE BY AERATOR-AGITATORS ('FUCHS'),
Kiel Univ. (West Germany).
U. Riemann.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 537-544, (1972). 2 fig, 1 tab.

Descriptors: *Farm wastes, *Hogs, *Aerobic treatment, *Waste water treatment, *Waste disposal, Odor, Salmonella, Liquid wastes, Foaming.
Identifiers: Swine, *Aerator-agitators, Liquid manure reactors.

An experimental plant was constructed consisting of 3 liquid manure reactors (each having a recirculating aerator), a pump sump pit, and an earth reservoir for evaporation and distribution of foam in order to investigate deodorization, biological disinfection, treatment, and disposal of pig manure through use of an aerobic treatment system. The pump sump pit received the liquid manure from the third reactor and the partially clarified liquid was distributed or directed to a storage tank. A nearly complete deodorization of fresh manure could be achieved after a daily refill of 3 m3 fresh manure. Bacteriological investigations using salmonellae indicated that the bacteria were dead six hours after entering reactor I at temperatures around 50C. Sedimentation tests indicated that organic and inorganic flucculants have a positive effect on the separation process. Fertilization trials revealed (1) Aerated liquid manure is less corrosive than untreated manure to plants. (2) A total of 50 m3/ha aerated liquid manure yields a 10% higher crop of summer barley than does the untreated. (3) Treated or untreated applications to rape-seed had a negative effect. (4) Fertilization of 150 m3/ha of aerated liquid manure on sugar beets gave a slightly better result than the untreated fertilization. (5) Corn digests high liquid manure quantities. Further investigations are in progress. (See also W74-09663) (Merryman-East Central)
W74-09705

NITROGEN LOSSES THROUGH DENITRIFICATION AND OTHER CHANGES IN CONTINUOUSLY AERATED POULTRY MANURE,
Guelph Univ. (Ontario).
G. G. Dunn, and J. B. Robinson.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 545-554, (1972). 10 fig, 1 tab, 7 ref.

Descriptors: *Nitrogen, *Farm wastes, *Poultry, *Waste storage, *Waste water treatment, Liquid wastes, *Oxidation lagoons, Denitrification, Temperature, Biochemical oxygen demand, Chemical oxygen demand, Organic loading, *Canada.
Identifiers: Loading rate, Total solids, Volatile solids.

The objectives were to: (a) determine the effectiveness of pilot scale oxidation ditches in stabilizing the organic loading placed on them, and (b) determine the conditions of oxidation-reduction potential in the liquid waste under which nitrogen was eliminated. Two trials were conducted. The first lasted 138 days during winter (average ditch temperature 11 deg C) conditions. The second lasted 160 days under summer (average ditch temperature 18 deg C) conditions. Two ditches were used which had dividing partitions separating the rotor in the ditches from the birds. The rotor speed on Ditch II was fixed at 95 rpm. The rotor speed in Ditch I (which was variable) was set for the same ditch velocity. Forty-two cages housing 90-100 white leghorns were suspended over each ditch and the droppings fell directly into the ditch. The winter loading rate was 120 mg/liter/day of biochemical-oxygen demand and 375 mg/liter/day of chemical oxygen demand. The summer rate was 150 mg/liter/day of BOD and 500 mg/liter/day of COD. Experimental results indicated that the oxidation ditches were adequate for storing and treating liquid chicken manure in an odor-free condition for periods up to 160 days under the experimental loading conditions. At this loading rate losses of 70-80% of the added nitrogen could be expected with little effect of temperature in the range 11 deg C-18 deg C. (See also W74-09663) (Merryman-East Central)
W74-09706

SOLIDS BALANCE ON A BEEF CATTLE OXIDATION DITCH,
R. O. Hegg, and R. E. Larson.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 555-562, (1972). 3 fig, 4 tab, 7 ref.

Descriptors: *Farm wastes, *Cattle, *Oxidation lagoons, Chemical oxygen demand, Biochemical oxygen demand, Hydrogen ion concentration, Liquid wastes, *Minnesota, *Waste water treatment, *Solid wastes.
Identifiers: Solids balance, Beef, Total solids, Total volatile solids.

The objective was to determine the solids balance on a summer operations of an oxidation ditch for 36 beef animals which were fed a high concentrate ration. This oxidation ditch also included the removal of some of the settled solids during the experiment. The solids balance was made by comparing the total solids, total volatile solids, and fixed solids of the waste matter going into the ditch with material taken out of the ditch. Input consisted of the fecal matter (4.6 pounds dry matter per day) and the urine (15.6 pounds per day) for each animal. The output consisted of the settled solids (partially digested corn) most of which were periodically removed during the experimental period for recycling. Total solids were reduced 39% and total volatile solids were relatively unchanged. (See also W74-09663) (Merryman-East Central)
W74-09707

LAGOONS FOR MILKING CENTER WASTES,
R. Crowe, and R. L. Phillips.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 563-567, (1972).

Descriptors: *Lagoons, *Dairy industry, *Farm wastes, *Waste storage, *Design criteria, *Waste water treatment, Cattle, Biochemical oxygen demand, *New York.

Rural Environmental Assistance Program cost-sharing by the federal government has spurred many requests for assistance from the Soil Conservation Service in construction of lagoons for milking center wastes. A farmer who requests assistance is usually visited by the Cooperative Extension agent, SCS, and a representative of the health department. Location and practicality of the lagoon are influenced by (a) nearest residence, (b) prevailing wind direction, (c) general soils in the area, (d) type of outlet-gravity or pumping, (e) discharge point, (f) stream location, characteristics, and classification, (g) herd size - present and future, (h) present waste disposal system and (i) estimated cost of the lagoon. Lagoon layouts are designed with a surfac0 area of 125 square feet per cow, are usually partially below and partially above the ground, and have a length to width ratio of 3:1. Rectangular shape is most economical. Maximum depth should be 5 feet and minimum 2 feet. The botton should be level. Once the details are worked out, a cost estimate is made and the drawings and estimate are reviewed with the landowner for his concurrence and approval. The drawings and specifications, with a summary design report and application, are then submitted to the county health department for approval. (See also W74-09663) (Merryman-East Central)
W74-09708

PILOT PLANT COMPARISON OF LIQUID AND DRY WASTE MANAGEMENT SYSTEMS FOR POULTRY MANURE,
Cornell Univ., Ithaca, N.Y.
D. C. Ludington, A. T. Sobel, R. C. Loehr, and A. G. Hashimoto.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 569-580, (1972). 2 fig, 4 tab, 6 ref.

Descriptors: *Farm wastes, *Liquid wastes, *Poultry, *Odor, *Oxidation lagoons, *Waste water treatment, Air pollution, Aeration, Solid wastes, Pilot plants.
Identifiers: *Waste management systems, Undercage drying-forced air, Undercage drying-fins, Diffused aeration.

Two primary waste management techniques are known to control the production of odors. The first is removal of moisture from manure soon after defecation. The second is to properly aerate a liquefied manure and maintain the waste in an aerobic condition. Four different systems based on these two techniques were studied: (a) oxidation ditch, (b) undercage drying-forced air, (c) undercage drying-fins, and (d) diffused aeration. These experiments proved that properly aerating a liquefied manure and removing sufficient moisture from fresh manure will control odors in a poultry house. If a high degree of odor control is necessary, then the properly aerated liquid manure system would be the one to select. If the conditions are less severe, undercage drying may accomplish sufficient odor control at a reduced operating cost. The losses of nitrogen for the various systems may or may not be an advantage depending upon the local situation and the point of ultimate disposal. The removal of volatile solids does permit operation at a lower total solids concentration with less dilution water. Specific trials and results are outlined and tabulated. (See also W74-09663) (Merryman-East Central)
W74-09709

CHEMICAL ADDITION TO TRICKLING FILTER PLANTS,
Beard (Arthur) Engineering, Inc., Chevy Chase, Md.
G. L. Nickerson, C. M. Robson, R. D. Morrison, and R. C. Clinger.
Journal Water Pollution Control Federation, Vol 46, No 1, p 133-147, January 1974. 9 fig, 7 tab, 3 ref.

Descriptors: *Filtration, *Virginia, Water treatment, *Biochemical oxygen demand, *Suspended solids, Hydraulic engineering, Chemical engineering, *Waste water treatment, *Trickling filters.
Identifiers: *Fairfax County(Va).

A chemical addition system for increasing the overall BOD and SS removals at two Fairfax County, Virginia, trickling filter wastewater treatment plants is described. Ferric chloride was added at the influent end of the grit chamber and cationic polymer was added in the Parshall flume, just before the flow enters the primary clarifiers. These additions achieved approximately 85 percent SS and 60 percent BOD removals. Hydraulic capacity was increased by raising the wall levels of critical manholes and structures where overflows had previously occurred, but this correction frequently caused an overflow at another. A total chemical cost to treat the liquid flow averaged approximately $85 per million gallons at one plant and $71 per million gallons at the other plant. Increased sludge handling problems may be expected when chemical addition to the liquid stream is practiced for increased removal of oxygen demanding materials. Existing sludge handling facilities should be carefully reviewed for adequacy. Any necessary improvement should be made before liquid stream chemical addition. Further, addition of chemicals to the sludge handling system may be required to enhance thickening and dewatering operations. (Merritt-FIRL)
W74-09710

SMALL TOWN SPENDS A BIG $8 MILLION,
Whitman and Howard, Inc., Boston, Mass.
R. E. Hickeman.
Water and Wastes Engineering, Vol 10, No 12, p 42-44, December, 1973.

Descriptors: *Water treatment, *Rhode Island, *Activated sludge, *Aeration, Septic tanks, Waste treatment, *Waste water treatment, *Tertiary treatment.
Identifiers: West Warwick(R.I.), Pawtuxet River(R.I.).

The design and operation of the secondary waste treatment plant in West Warwick, Rhode Island are described. Renovation and enlargements were made on existing plants to provide a 5.0 mgd facility to help clean up the Pawtuxet River. The $2.5 million treatment plant can provide conventional complete mix activated sludge and step aeration methods of secondary treatment depending on the quality, quantity, and characteristics of the raw wastewater. Septic from individual homeowner cesspools and septic tanks is delivered by tank trucks in a daily volume ranging from 6,000 to 25,000 gallons. The septage is passed to a receiving tank, chlorinated for odor control, degritted, and stored. Four square aeration tanks each with one 7.5 hp fiberglass mechanical surface aerator registers BOD levels ranging from 1000 milligrams/liter to 350 milligrams/liter. The system readily adjusts to varying demands while maintaining a mixed liquor concentration between 2,900 and 4,700 milligrams/liter and dissolved oxygen levels between 2.0 and 3.0 milligrams/liter. The digester was converted into a post-chlorine contact tank which pumps the excess activated sludge into two sludge flotation thickeners. The thickened sludge is then dewatered. (Merritt-FIRL)
W74-09711

ALTERNATIVE STRATEGIES FOR MANAGING WASTEWATER,
Indiana Univ., Bloomington. School of Public and Environmental Affairs.
R. S. Howe.
Journal of Soil and Water Conservation, Vol 28, No 6, p 252-255, November/December, 1973. 2 tab, 10 ref.

Descriptors: *Water management(Applied), Water treatment, *Activated sludge, *Land management, Land use, *Waste water treatment, Waste disposal.
Identifiers: *Physical-chemical treatment, *Land disposal.

Strategies for managing wastewater are discussed; they include the activated sludge process, physical-chemical treatment, and land disposal. The activated sludge process consists of pretreatment, primary clarification, and single stage biological treatment. The process requires some means for disposing of sludge, as through dewatering at the plant and then transporting the dried solids to a land disposal site, or it may entail transport of liquid sludge by barge, truck, or pipe to a land disposal site. The physical-chemical process requires a means for disposal of the substantial quantities of solids that are generated. Chemicals frequently used are lime, alum, and iron salts. Land disposal systems can be categorized as infiltration systems (recharge basins, septic tanks, absorption fields, spray disposal, and ridge and furrow basins) or irrigation systems (spray irrigation, flood irrigations, and the living filter). Advantages of the activated sludge system include small land area, lower initial capital investment, removal of certain toxic materials, ability to handle overload situations, and greater immunity to the vagaries of weather. Disadvantages include higher operating costs, more difficult operation, and use of chemicals that may introduce trace quantities of impurities that result in water quality standard violations. (Merritt-FIRL)
W74-09712

A MEMBRANE BIOLOGICAL FILTER DEVICE FOR REDUCING WATERBORNE BIODEGRADABLE POLLUTANTS,
Boyce Thompson Inst. for Plant Research, Inc., Yonkers, N. Y.
G. W. McClure.
Water Research, Vol 7, No 11, p 1683-1690, 1973. 2 fig, 2 tab, 12 ref.

Descriptors: Filtration, Membranes, *Biological membranes, *Membrane processes, *Filters, *Herbicides, *Biodegradation, *Waste water treatment.
Identifiers: Isopropylphenylcarbamate.

A membrane biological filter device for reducing waterborne biodegradable pollutants was modeled by a laboratory system. A phenylcarbamate-degrading population of microorganisms reduces the concentration of the herbicide isopropylphenylcarbamate (IPC) in a continuously flowing stream. The microorganisms are kept separate from the feed stream by an ultrafilter membrane which retains the microorganisms, but allows passage of all smaller materials. As the feed stream passes through the device, IPC is transferred to the bath of microorganisms and metabolized. The percentage reduction of IPC in the feed stream depends primarily on the efficiency of transfer across the membrane, the velocity of the feed stream, the quantity of microbes retained in the bath, and the factors affecting their activity. An equation is derived relating these variables under the assumption of complete transfer of IPC to the bath and a constant rate of IPC degradation per unit of microbes. Problems and improvements are discussed. (Merritt-FIRL)
W74-09713

OZONE: AN ALTERNATIVE TO CHLORINE,
J. T. Sliter.
Journal Water Pollution Control Federation, Vol 46, No 1, p 4-6, January, 1974.

Descriptors: Municipal water, *Ozone, *Coliforms, Sewage bacteria, *Disinfection, Viruses, Biochemical oxygen demand, Chemical oxygen demand, Phenols, *Waste water treatment, Costs.
Identifiers: Cyanides.

The advantages of ozone as an alternative to chlorine disinfection of wastewaters are discussed. Beginning in 1977, all municipal treatment plants must disinfect their effluent to achieve a fecal coliform level of 200/100 milliliters. Pilot investigations show that ozone is a quicker and more efficient disinfectant than chlorine by a factor of 3,000. A five milligram/liter dose of ozone applied for less than two minutes yielded a significant reduction in total plate count and fecal coliform levels in wastewater effluent. Ozone can reduce the number of viruses, but the techniques are tentative, and actual reductions uncertain. Ozone does not leave a residual of compounds toxic to aquatic life. Ozone can reduce the concentration of suspended solids to less than two milligrams/liter. Tertiary treatment plants have used ozone to reduce the biochemical oxygen demand, the chemical oxygen demand, cyanides, and phenols. About two parts ozone destroy one part phenol. Production cost is the largest single item in ozone treatment. It would cost a one mgd plant using ozone for tertiary treatment $0.26/1000 gal; but a 50 mgd plant, only $0.10/1000 gal. (Merritt-FIRL)
W74-09714

CARBON TREATMENT OF A MUNICIPAL WASTEWATER,
Envirotech Corp., Salt Lake City, Utah. Eimco Process Machinery Div.
D. E. Burns, and G. L. Shell.
Journal Water Pollution Control Federation, Vol 46, No 1, p 148-164, January, 1974. 8 fig, 13 tab, 21 ref.

Descriptors: *Utah, *Pilot plants, Carbon, *Waste water treatment, Municipal wastes, *Sewage treatment.
Identifiers: *Salt Lake City(Utah), Powdered carbon, *Carbon treatment.

The use of powdered carbon for the removal of soluble organics from municipal raw wastewater was evaluated in a Salt Lake City, Utah, pilot plant study. The carbon treatment system included two carbon contactors, a granular media filter, a gravity thickener, and a vacuum filter. Solid contact units were very effective for contacting and removing powdered carbon for chemically treated and gravity clarified municipal wastewater. The two-stage, counter-current contacting was more efficient, (requiring less carbon) than single-stage contacting. The total solids recycle and variable area clarification zone features of the units used were key factors in providing a significant level of biological activity without odor problems and in accomplishing effective removal of carbon solids. Effective gravity clarification of carbon suspensions was achieved at overflow rates of up to 0.8 gpm/sq ft without the use of flocculation aids. Granular media filtration effectively removed carbon particles from carbon contactor effluent. Alum treatment followed by a two-stage countercurrent carbon contacting with 75 milligram/liter dosage would cost $0.83/1000 gal, including chlorination. The predicted plant effluent quality would be considerably better than a secondary biological treatment effluent for all parameters, but particularly for phosphorus and suspended solids. (Merritt-FIRL)
W74-09715

DATA ACQUISITION AND COMBINED SEWER CONTROLS IN CLEVELAND,
Cleveland Dept. of Public Utilities, Ohio.
K. A. Pew, R. L. Callery, A. Brandstetter, and J. J. Anderson.
Journal Water Pollution Control Federation, Vol 45, No 11, p 2276-2289, November, 1973. 10 fig, 9 ref.

Descriptors: *Combined sewers, *Rainfall-runoff relationships, Storm runoff, *Waste water treatment, Model studies, *Ohio, Water storage.
Identifiers: *Cleveland(Ohio).

The development of a system for the comprehensive control of combined sewer overflow pollution in the Southerly Sewerage District of Cleveland, Ohio, is described. The project will acquisition and analyze real time rainfall and sewer system load information, and will operate by closed loop automatic control. The control system will operate an optimum combination of control, storage, treatment, and conveyance facilities. Automatic wastewater samplers have been purchased, and automated chemical analyzers are being acquired to analyze chemical oxygen demand, total Kjeldahl nitrogen, sulfate, phosphate, nitrate, ammonia, and chloride. Mathematical models were developed and used as analytical tools for the design and control of the sewer system improvements, and remotely operated regulators were designed. The construction cost has not yet been estimated, but should be in the order of $60 million or approximately $300/acre ($7400 ha), less than the cost of sewer separation. (Merritt-FIRL)
W74-09716

WASTEWATER SYSTEM ALTERNATES: WHAT ARE THEY...AND WHAT COST,
Anderson-Nichols and Co., Boston, Mass. Environmental Sciences Div.
R. P. Monti, and P. T. Silbermann.
Water and Wastes Engineering, Vol 11, No 4, p 36-40, April, 1974. 5 fig, 1 tab.

Descriptors: *Waste water treatment, *Alternate planning, Ammonia, Suspended solids, BOD, Waste disposal, *Filtration, Filters, Nitrification, Nitrates, *Waste disposal, *Denitrification, Effluents, Infiltration, Irrigation, Runoff.
Identifiers: *Polishing ponds, Microstraining device, *Treatment alternatives, Sand filtration.

Alternatives to conventional secondary waste treatment that will meet the best possible practical treatment requirements of 1983 are discussed. Because the Federal requirements are not entirely clear on BOD, ammonia, and suspended solids, an additional treatment step is proposed. If land is available, the least costly treatment may be a polishing pond. If no land is available, rapid sand filtration columns could be used. A microstraining device could remove additional suspended solids and their associated BOD from treatment plant effluents. The most economical method of ammonia removal is single stage nitrification. This biological process converts ammonia to nitrates in an aeration tank. The most troublesome of the pollutants is nitrate which has a maximum allowable groundwater limit of 10 mg/liter. If ground disposal is chosen, the most reasonable type of denitrification process would be a packed column reactor added after conventional treatment and using methanol addition as a source of carbon for the denitrifying organisms. In the case of land disposal, there are three basic techniques for surface application of waste water effluent to the land: spray irrigation, overland runoff, and rapid infiltration. (Merritt-FIRL)
W74-09718

STOCHASTIC ANALYSIS OF ORTHOKINETIC FLOCCULATION,
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
P. W. Cockerham, and D. M. Himmelblau.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE2, p 279-293, April, 1974. 8 fig, 1 tab, 7 ref.

Descriptors: *Stochastic processes, *Flocculation, *Water treatment, Model studies, Dispersion, *Waste water treatment, Statistical methods.

The application of a stochastic analysis to orthokinetic flocculation, a common operation in water treatment, is illustrated. Both the unsteady-state and the steady-sample response could be represented by a normal distribution regardless of the types of distributions used for the flocculation model inputs and parameters. The sample mean response agreed with the deterministic solution if normal distributions are used for the flocculation model inputs and parameters, but not otherwise. Dispersion in the model parameter had a greater effect on the dispersion of the sample output than did the model parameters. Dispersion in G (the root mean squared velocity gradient) had the least effect on the dispersion of the sample output. The degree of dispersion in the process flow rate had little effect on the flocculator overdesign factor. The stochastic approach is applicable to the stochastic analysis of other important processes in water and waste water treatment. Of particular value is the method of calculating overdesign factors. The stochastic approach does not reduce the uncertainty involved in the processes, but it does not allow one to make more objective decisions about the uncertainty. This is becoming more and more important as effluent quality standards become more stringent. (Merritt-FIRL)
W74-09719

APPARATUS FOR TREATING WASTE FLUIDS BY MEANS OF DISSOLVED GASES,
Pollution Control Engineering, Inc., Downey, Calif. (assignee).
G. E. Hurst.
U.S. Patent 3,773,179. Official Gazette of the United States Patent Office, Vol 916, No 3, p 932, November 20, 1973.

Descriptors: *Suspended load, Suspended solids, *Waste disposal, *Patents, Equipment, *Waste water treatment.
Identifiers: Apparatus.

An apparatus for treating wastewater to remove suspended pollutants is described. It consists of a tank with a plurality of compartments through which the fluid is repeatedly pumped from one compartment to the next. At each pumping station, gas is injected at the suction side of the pump and back pressure is maintained in the discharge line to force more gas into solution. Effluent from each compartment is taken near the bottom and the discharge is located midway of the height, confined to a small area, and then deflected by a deflector plate. Clarified water is removed by a riser tube from the bottom of the final compartment and flows over a weir. The floated matter is removed from the fluid surfaces in each compartment by skimming or other methods. (Merritt-FIRL)
W74-09721

METHOD FOR TREATING WATER CONTAINING SUSPENDED SOLIDS FROM A SANITARY SYSTEM,
Ecodnye Corp., Chicago, Ill. (assignee).
J. W. McKibben, B. L. Goodman, and R. B. Higgins.
U.S. Patent 3,770,624. Official Gazette of the United States Patent Office, Vol 916, No 1, November 6, 1973.

Descriptors: Suspended solids, Treatment, *Separated sewers, *Recycling, *Aeration, *Patents.
Identifiers: Apparatus.

An improved method and apparatus for treating water containing suspended solids from a sanitary system are described. The water is aerated and delivered to a screen with a directional component across the screen surface and a directional component through the screen. The screen has openings large enough to pass the majority of the solids suspended in the water, and has the ability to hold a coating of these solids on its upstream side. The flow of water is controlled so that a coating of the suspended solids from the water is formed on the screen surface. The delivery of water containing these suspended solids to the screen is continued with a directional component across the screen and a directional component through the screen, in order to filter solids from the water passing through the coating and screen. The relationship between the directional components across and through the screen is controlled to maintain the coating on the screen. The water that is passed through the screen is stored, and is recycled to the sanitary system. (Merritt-FIRL)
W74-09724

APPARATUS FOR RELEASING CHEMICALS CLEARING AND CLEANING WASTE PIPES,
R. M. Stalnaker.
U. S. Patent 3,771,968. Official Gazette of the United States Patent Office, Vol 916, No 2, p 617-618, November 13, 1973.

Descriptors: *Pipes, Engineering structures, *Sewers, *Cleaning, Treatment, *Patents.
Identifiers: Apparatus.

An apparatus for releasing chemicals that clears and cleans waste pipes is described. An elongated tubular-shaped dispenser with a plurality of axially and circumferentially spaced openings is attached to a rotational support plug. The dispenser releases chemicals in predetermined amounts in response to flushing water. It is capable of destroying, clearing, and cleaning obstructions located in the waste pipe. A chemical capable of aiding in the control of pollution could also be utilized in the dispenser. The disposable dispenser is replaced after the chemicals are released. (Merritt-FIRL)
W74-09725

WASTEWATER TREATMENT USING ELECTROLYSIS WITH ACTIVATED CARBON CATHODE,
General Electric Co., Schenectady, N.Y. (assignee).
M. Kawahata, and K. R. Price.
U.S. Patent 3,788,967. Official Gazette of the United States Patent Office, Vol 918, No 5, p 1968, January 29, 1974.

Descriptors: Waste water, *Electrolytes, *Activated carbon, *Waste water treatment, *Oxidation, Municipal wastes, *Patents.

An improvement in the electrolytic treatment of wastewater is described in which the reduction of oxygen on an activated carbon cathode is employed to form hydrogen peroxide. The peroxide oxidizes the organic carbon pollutants in the wastewater. The oxygen is fed to the activated carbon cathode from outside the electrolytic cell. The cathode is part of the enclosure for feeding the gas to the surface, which forms part of the boundary of the cell compartment. (Merritt-FIRL)
W74-09729

VACUUM SEWAGE CONVEYING WITH VACUUM OPERATED VALVE,
B. C. Burns.
Patent 3,788,338. Official Gazette of the United States Patent Office, Vol 918, No 5, p 1812-1813, January 29, 1974.

Descriptors: Pipes, Engineering structures, *Sewage, *Pipelines, *Sewage disposal, *Patents, Waste water treatment.
Identifiers: *Vacuum sewage conveyance.

A method and apparatus for conveying sewage by vacuum-induced plug flow are described. The sewage is drawn from a sewage-collecting region into a vacuum line pipe through a valve, and moves toward the source of vacuum by vacuum-induced plug flow caused by the interposition of volumes of air between plugs of sewage. A control zone in an operator portion of the vacuum valve is controllable by a low-pressure reservoir for opening the valve. The reservoir is maintained at a low pressure through a vacuum tap conduit communicable with the reservoir and the vacuum line conduit. The sewage-collecting region may be an underground collecting tank which contains equipment for controlling operation of the vacuum valve which may be located outside the collecting region in a separate housing just below grade. Electrical power used at the collecting region may be supplied solely from a central panel through cable laid in a trench along the vacuum line conduit. A rigid pipe assembly in the collecting tank is connected several feet above the tank bottom, but below grade, to a pipe assembly of the vacuum valve, and the orientation may be such as to permit disconnection of pipes at the vacuum valve without causing leakage in the region where workmen must stand. (Merritt-FIRL)
W74-09731

PRIMING UNIT FOR DISTRIBUTING PRIMING WATER TO MULTIPLE SEWER LINE WATER TRAPS,
Precision Plumbing Products, Inc., Portland, Oreg. (Assignee).
J. B. Watts.
U.S. Patent 3,776,269. Official Gazette of the United States Patent Office, Vol 917, No 1, p 144, December 4, 1973.

Descriptors: Conduits, Water transfer, *Sewers, *Conveyance structures, Equipment, *Patents, Waste water treatment.
Identifiers: *Priming water.

A priming unit for distributing priming water to multiple sewer line water traps is described. It consists of a case of compact dimensions and means for coupling the case to a source of priming water. A plurality of water outlet pipes penetrate the case floor by a predetermined distance to permit use of the water contained in the case to measure the level condition of the unit. There is substantially equal distribution of priming water through all the pipes to the various sewer line water traps. (Merritt-FIRL)
W74-09732

SOME LESSONS FROM MODEL AND FULL-SCALE TESTS IN RECTANGULAR SEDIMENTATION TANKS,
Imperial Chemical Industries Ltd., Runcorn (England). Mond Div.
G. A. Price, and M. S. Clements.
Water Pollution Control, Vol 78, No 1, p 102-113, 1974. 8 fig, 11 tab, 7 ref.

Descriptors: *Waste water treatment, *Model studies, *On-site tests, *Settling basins, Sedimentation, Treatment facilities, Efficiencies, Intakes.
Identifiers: Inlet design, Flow-through time, Settling time.

Results of research into the effects of inlet changes, density and wind-induced currents on the performance of rectangular sedimentation tanks are summarized. The investigation included experiments on both models and full-scale tanks at six sewage works to test the importance of time ratio and inlet design on the efficiency of tanks. Time ratio is 00046measure of the streaming throu the tank and defined as the ratio of effective flow-through time to effective settling time with an ideal value of unity. (Sandoski-FIRL)
W74-09736

COAGULATION OF STORMWATERS AND LOW ALKALINITY WASTEWATERS,
Notre Dame Univ., Ind.
L. H. Ketchum, Jr., and W. J. Weber, Jr.
Journal Water Pollution Control Federation, Vol 46, No 1, p 53-62, January, 1974. 17 fig.

Descriptors: Chemical engineering, Water treatment, *Storm water, Hydrogen ion concentration, *Alkalinity, *Waste water treatment, *Lime, *Silica, *Coagulation.
Identifiers: Activated silica, Clarification.

The clarification of low alkalinity wastewaters by the chemical combination of lime and activated silica was investigated. To facilitate control and to study significant variables, synthetic systems were made by adding known quantities of selected substances to water to produce the desired experimental characteristics. Studies of stormwaters and wastewaters were subsequently conducted to confirm the observation made on the synthetic systems. The lime and activated silica were effective. Low alkalinity wastewater can be coagulated with .002 moles/liter of lime or .00075 moles/liter of lime plus 3.75 milligrams/liter of activated silica. Based on these dosages, the cost per million gallons of wastewater treated using lime alone and lime plus activated silica are $11.92 and $8.72, respectively. This chemical cost savings and the decreased sludge to be handled make the use of activated silica economically advantageous for low alkalinity wastewaters. (Merritt-FIRL)
W74-09738

DEVELOPMENTS IN THE TREATMENT OF SEWAGE FROM SMALL COMMUNITIES.
Department of the Environment, (U.K.), Notes on Water Pollution, No 60, p 1-4, March, 1973. 14 ref.

Descriptors: *Sewage treatment, *Treatment plants, *Rural areas, Maintenance, Septic tanks, Percolation, Activated sludge, Aeration, Stabilization, Oxidation lagoons, Biological treatment, Filtration, Effluents, Suspended solids, Filters, Digestion tanks, Sludge disposal, *Waste water treatment.
Identifiers: *United Kingdom.

The treatment of sewage from small communities is discussed and recent developments are described. Many problems of small treatment plants relate directly to the fact that small plants can normally provide little supervision or maintenance and privately owned plants are especially liable to serious neglect. Before 1960, there was essentially only a combination of septic tanks and percolating filters for treating sewage from small communities. During the last decade a variety of modified activated sludge systems has been actively developed particularly for small scale use. Three forms of plant have evolved: extended aeration, contact stabilization, and the oxidation ditch. Purification plants using rotary disc biological contactors have recently been introduced into the United Kingdom. Extended filtration and submerged bed aeration plants have been commercially developed to a small scale as small package plants. The main developments in effluent polishing for small systems have been with the simplest systems: grass plots, upward flow clarifiers; and slow sand filters. The use of separate aerobic digestion plants to stabilize raw or septic tank sludge at central collection works has overcome the problem of sludge disposal. (Merritt-FIRL)
W74-09743

CHEMISTRY OF MODERN WATER CHLORINATION, I, INTRODUCTION, II, THE CHEMISTRY OF CHLORINATION,
Newcastle and Gateshead Water Co., Newcastle-upon-Tyne (England).
A. T. Palin.
Water Services, Vol 78, No 935, p 9-12, January, 1974. 3 fig, 2 tab, 8 ref.

Descriptors: *Chlorination, *Chlorine, *Reviews, *Disinfection, *Water treatment, Waste water treatment.

A review of the present state of chlorine use for the disinfection of water is presented with emphasis on the chemistry of chlorination. The forms of chlorine, which include gas, solutions, solids, and new products, chlorine dissolved in water, breakpoint reactions, and definitions of modern chlorination are discussed. (See also W74-09745) (Sandoski-FIRL)
W74-09744

CHEMISTRY OF MODERN WATER CHLORINATION, III, DISINFECTION BY CHLORINE, IV, CHLORINATION OF WASTE-WATER AND INDUSTRIAL WATERS,
Newcastle and Gateshead Water Co., Newcastle-upon-Tyne (England).
A. T. Palin.
Water Services, Vol 78, No 936, p 53-56, February, 1974.

Descriptors: *Reviews, *Disinfection, *Chlorine, *Water treatment, Hydrogen ion concentration, Temperature, *Waste water treatment, Industrial water, *Chlorination.
Identifiers: Residual chlorine, Contact time.

Disinfection by chlorine is discussed with regard to the effect of the hydrogen ion concentration, the effect of temperature and time of contact, and the nature of residual chlorine and minimum safe levels. Also discussed are the chemistry of waste water chlorination, residual chlorine control, and chlorine requirements. (See also W74-09744) (Sandoski-FIRL)
W74-09745

PROTEIN RECOVERY FROM PROCESS EFFLUENTS USING ION-EXCHANGE RESINS,
Tasman Vaccine Lab. Ltd., Poole (England). Ecotech Systems Div.
R. A. Grant.
Process Biochemistry, Vol 9, No 2, p 11-14, February/March, 1974. 2 fig, 12 tab.

Descriptors: *Ion-exchange, *Resins, *Proteins, *Effluents, Food processing industry, Hydraulic properties, Biochemical oxygen demand, Adsorption, Water treatment, Industrial wastes, Byproducts, Waste water treatment.
Identifiers: *Recovered protein.

A process was developed which permits the separate recovery of protein and fat from meat, poultry and other food processing effluents, while at the same time achieves a large reduction in the BOD level. The process uses a recently developed ion-exchange resin capable of adsorbing proteins and other macromolecules. The resins can be manufactured in the granular form giving excellent hydraulic properties. They can be used in a conventional type plant with the usual facilities for cleaning the bed by backwashing. Both anion and cation exchange forms of the resin are available and combination of these makes it possible to treat water up to a very high standard, that is, BOD values of less than 10 mg/liter have been achieved. (Merritt-FIRL)
W74-09747

TUNNELS MAY STORE STORMWATER FOR LATER TREATMENT.
The American City, Vol 88, No 12, p 75, December, 1973.

Descriptors: *Wisconsin, *Tunnels, *Storm water runoff, Subsurface drainage, *Storm drains, *Underground storage, Combined sewers, Sanitary sewers.
Identifiers: *Milwaukee(Wisc).

A study of a proposal to build 20 miles of tunnels in bedrock under Milwaukee to store overflow from a combined sanitary and storm sewer system was approved by a Southwestern Wisconsin Regional Planning Commission committee. The tunnels would measure about 30 by 40 feet each, would be 250 feet below the surface, and would connect 112 outfalls of three rivers. If the three-year, $2.3 million study is approved by the necessary agencies the Federal government would pay 75 percent of the $175 million cost, the state 12.5 percent, and the sewerage commission 12.5 percent. (Merrit-FIRL)
W74-09749

MERCURY REMOVAL BY CONVENTIONAL WATER-TREATMENT TECHNIQUES,
National Environmental Research Center, Cincinnati, Ohio. Water Supply Research Lab.
For primary bibliographic entry see Field 5F.
W74-09773

SOLVENT EXTRACTION IN PROCESSES FOR METAL RECOVERY FROM SCRAP AND WASTE,
Warren Spring Lab., Stevenage (England).
A. W. Fletcher.
Chemistry and Industry, p 414-419, May 5, 1973. 15 fig, 2 tab, 14 ref.

Descriptors: *Industrial wastes, *Recycling, *Solvent extractions, *Metals, Metallurgy, Nickel, Cobalt, Effluents, Sludge treatment, Leaching, Separation techniques, *Waste water treatment.

A significant and growing proportion of metals consumed by industry is being provided by the recycling of scrap and/or waste. These include process wastes, capital wastes, domestic refuse, and effluents. Traditionally, the processes used to recover metal from wastes were pyrometallurgical, but currently there has been growing interest in hydrometallurgical processes, involving dissolution, separation and reduction to metal. In this sequence of operations, solvent extraction is proving to be a versatile method for metal recovery. The equipment requirements are modest, the process is simple to operate on a continuous basis, and its value and versatility has been proved by successful commercial application. Several metal recovery techniques involving solvent extraction are described in detail for the case of refractory Ni-Co alloy scrap which is not amenable to processing by conventional techniques. Flowsheets are presented for the recovery of copper, zinc, and cadmium from base metal and for the recovery of cobalt, nickel, iron, copper, chromium, zinc, and manganese from chemical process wastes. Profitable application of the solvent extraction method to treatment of effluents depends on flow and metal content of the waste. (Jernigan-Vanderbilt)
W74-09784

5E. Ultimate Disposal Of Wastes

GROUND WATER QUALITY AND SOLID WASTE MANAGEMENT-- A SELECTIVE BIBLIOGRAPHY,
California State Dept. of Water Resources, Sacramento.
D. M. Hill, and R. Zipp.
Central District Report, March 1974. 59 p, 389 ref.

Descriptors: *Bibliographies, *California, *Water pollution, *Landfills, *Garbage dumps, Waste disposal.
Identifiers: Solid waste management.

As a step in evaluating the potential for groundwater degradation beneath solid waste disposal sites in California under varying climatic, geologic, and other conditions, a list of reports on solid

wastes and groundwater quality was compiled. The list is stored on tape so that new entries can be inserted and old entries corrected easily in anticipation of periodic updating of the list. (Knapp-USGS)
W74-09319

UNDERGROUND INJECTION OF WASTEWATERS IN THE OHIO VALLEY REGION.
Ohio River Valley Sanitation Commission, Cincinnati. Committee on Subsurface Industrial Wastewater Injection.
For primary bibliographic entry see Field 5G.
W74-09324

WASTE MANAGEMENT: GENERATION AND DISPOSAL OF SOLID, LIQUID AND GASEOUS WASTES IN THE NEW YORK REGION,
Regional Plan Association, N.Y.
For primary bibliographic entry see Field 5G.
W74-09353

GEOLOGIC ASPECTS OF LANDFILL REFUSE DISPOSAL,
Louisville Univ., Kentucky. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-09375

DISPOSAL OF AIRCRAFT WASHRACK WASTE WATER,
New Mexico Univ., Albuquerque. Eric H. Wang Civil Engineering Research Facility.
For primary bibliographic entry see Field 5D.
W74-09376

THE USE OF OCEAN OUTFALLS FOR MARINE WASTE DISPOSAL IN SOUTHEAST FLORIDA'S COASTAL WATERS,
Miami Univ., Fla. Sea Grant Institutional Program.
For primary bibliographic entry see Field 5D.
W74-09403

PROCEEDINGS-WORKSHOP ON LAND DISPOSAL OF WASTEWATERS.
North Carolina State Univ., Raleigh. Water Resources Research Inst.
For primary bibliographic entry see Field 5D.
W74-09422

MANAGEMENT OF LANDS USED FOR WASTE DISPOSAL,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 5D.
W74-09424

WASTEWATER AND SOIL INTERACTION,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 5D.
W74-09425

IRRIGATION COST FOR LAND DISPOSAL,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-09428

COSTS AND RETURNS OF LAND SPREADING WASTWATER,
North Carolina State Univ., Raleigh. Dept. of Economics.
For primary bibliographic entry see Field 5D.
W74-09429

DEWATERING DIGESTED PRIMARY SLUDGE,
Los Angeles County Sanitation District, Calif.
For primary bibliographic entry see Field 5D.
W74-09441

AVAILABLE AIR MEASUREMENTS APPLIED TO FLOTATION THICKENER EVALUATIONS,
CH2M/Hill, Inc., Corvallis, Oreg.
For primary bibliographic entry see Field 5D.
W74-09451

STUDY OF THE DIFFUSION OF THE DEEP SEA DISPOSAL OF RESIDUAL WATER,
For primary bibliographic entry see Field 5B.
W74-09472

ENVIRONMENTAL HAZARDS OF NUCLEAR WASTES,
For primary bibliographic entry see Field 5B.
W74-09502

AGRICULTURAL WASTE MANAGEMENT,
Oregon State Univ., Corvallis. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-09504

STATE-OF-THE-ART OF WASTE DISPOSAL IN THE COATINGS INDUSTRY (AS OF JUNE 1973),
R. Tackett.
Journal of Paint Technology, Vol 46, No 590, p 63-68, March, 1974. 8 tab.

Descriptors: *Survey, *Waste disposal, *Coatings, *Reclamation, *Industrial wastes, Pollution abatement, Equipment, Dusts, Liquid wastes, Solid wastes, Gases, Recycling, Landfills, Sludge disposal, Alternate planning.

The results of a survey on waste disposal techniques currently in use in the coatings industry are discussed. The questionnaire which was answered by 558 companies, was divided into four parts: vapors, liquids, dusts, and solids. Questions concerning installation of control equipment and its operation were asked in each section. Equipment was installed by 114 companies for controlling water based liquid wastes. The most popular methods of control were settling tanks, ponds, or basins. The main problem of control methods for all wastes is that they generate a solid waste or sludge which presents a serious disposal problem. The coating industry will have to develop an alternate method to landfill for disposal of solid waste or sludge. Reclamation may be most suitable because of the value of some of the components. (Merritt - FIRL)
W74-09506

SUBSURFACE DISPOSAL OF WASTE IN CANADA, INJECTION OF LIQUID WASTES IN DEEP WELLS, A PRELIMINARY APPRAISAL,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 5B.
W74-09536

SUBSURFACE DISPOSAL OF PICKLE LIQUOR,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
A. F. Bayazeed, and E. C. Donaldson.
Available from NTIS, Springfield, Va. 22151 as PB-225 273, Price $3.00 printed copy; $1.45 microfiche. Bureau of Mines Report of Investigations RI-7804, 1973. 31 p, 23 fig, 6 tab, 13 ref.

Descriptors: *Waste disposal wells, *Injection wells, *Acids, *Chemical wastes, Water pollution effects, Industrial wastes, Path of pollutants, Sandstone, *Illinois, *Indiana.
Identifiers: Pickle liquors(Wastes), *Mt. Simon Sandstone(Ill.-Ind.).

Underground injection of waste pickle-liquor from steel processing was surveyed. Hydrochloric and sulfuric acids are being injected into deep wells completed in the Cambrian age Mt. Simon Sandstone Formation in Illinois and Indiana. The average depth of injection wells is 4,000 feet, and injection is mostly by gravity flow at rates as high as 4,000 barrels per day. The details of the design and operating history of a well located near Gary, Ind., are discussed. Laboratory tests show that the Mt. Simon Sandstone is sensitive to freshwater. The adsorption of iron and neutralization of acids by sandstone was estimated using cores from deep wells and an outcrop. (Knapp-USGS)
W74-09583

WASTE MANAGEMENT RESEARCH.
For primary bibliographic entry see Field 5D.
W74-09663

PYROLYSIS AS A METHOD OF DISPOSAL OF CATTLE FEEDLOT WASTES,
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5D.
W74-09673

DAIRY MANURE WASTE HANDLING SYSTEMS,
For primary bibliographic entry see Field 5D.
W74-09674

AUTOMATED HYDRAULIC WASTE-HANDLING SYSTEM FOR A 700-HEAD SWINE FACILITY USING RECIRCULATED WATER,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 5D.
W74-09682

OPERATIONAL PROBLEMS OF PORK PRODUCTION RELATED TO ENVIRONMENTAL QUALITY,
For primary bibliographic entry see Field 5D.
W74-09683

OPERATIONAL PROBLEMS OF POULTRY PRODUCTION RELATED TO ENVIRONMENTAL QUALITY,
For primary bibliographic entry see Field 5D.
W74-09689

EVALUATION OF SWINE WASTE TREATMENT ALTERNATIVES,
North Carolina State Univ., Raleigh.
For primary bibliographic entry see Field 5D.
W74-09691

EVALUATION OF BEEF WASTE MANAGEMENT ALTERNATIVES,
Oklahoma State Univ., Stillwater.
For primary bibliographic entry see Field 5D.
W74-09693

CHARACTERISTICS OF WASTES FROM SOUTHWEST BEEF CATTLE FEEDLOTS,
Texas Tech Univ., Lubbock.
For primary bibliographic entry see Field 5D.
W74-09694

TREATMENT AND DISPOSAL OF SWINE WASTE,
For primary bibliographic entry see Field 5D.
W74-09704

5F. Water Treatment and Quality Alteration

CLEAN WATER--A CHALLENGE TO THE NATION, HIGHLIGHTS AND RECOMMENDATIONS OF THE NATIONAL CONFERENCE ON WATER POLLUTION.
Public Health Service, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-09260

HEALTH ASPECTS OF LAND APPLICATION OF WASTEWATER AT MILITARY INSTALLATIONS,
Army Medical Research and Development Command, Washington, D.C. Sanitary Engineering Research Branch.
For primary bibliographic entry see Field 5D.
W74-09426

'PIG' BRINGS BACK CAPACITY,
Denver Water Dept., Colo.
For primary bibliographic entry see Field 8C.
W74-09516

RURAL WATER SYSTEM DESIGNED FOR SUBURBAN USE,
Public Works, Vol 104, No 11, p 77, November, 1973.

Descriptors: *Water supply development, Water management(Applied), Rivers, *Ohio, Economics, *Financing, Loans, *Rural areas, Suburban areas, *Water treatment.
Identifiers: Olentangy River(Ohio), Columbus(Ohio).

The organization of the non-profit Del-Co Water Company to build and operate a rural water system designed for suburban use near Columbus, Ohio is described. The company was financed by a membership fee and a loan of $225,000 from the Farmers Home Administration. There are more than 1,500 members in Del-Co, which consists of a basic water plant and 122 miles of distribution lines. An additional 80 miles of distribution piping will complete the project. The source of supply is the Olentangy River, the water of which is hard and contains iron. A processing plant was built using the usual processes of coagulation, sedimentation, and filtration. Initially it will handle 1 1/4 mgd, but can be expanded to 3 mgd. An O-ring joint system connects the vinyl pipes. (Merritt-FIRL)
W74-09519

WATER SUPPLY IMPROVEMENT PROJECT,
Ohio Dept. of Health, Columbus. Div. of Sanitation.
For primary bibliographic entry see Field 5B.
W74-09542

ULTRAFILTRATION WATER TREATMENT,
Dorr-Oliver Inc., Stamford, Conn.
C. V. Smith, and D. Di Gregorio, Jr.
In: Membrane Science and Technology; Proceedings of Symposium held at the Columbus Laboratories of Battelle Memorial Institute, October 20-21, 1969, Columbus, Ohio: Plenum Press, New York, N.Y., p 209-219, 1970 (second printing 1973). 9 fig, 2 tab.

Descriptors: *Filtration, *Membrane processes, *Water treatment, Pores, Water quality, Water purification, Filters, Membranes, Reverse osmosis.
Identifiers: *Ultrafiltration.

Ultrafiltration is a sieving operation in which membrane pore size is the principal determinant in the separation mechanism. This approach is in contrast to reverse osmosis, in which diffusion is the main mechanism. Ultrafiltration membranes are noncellulosic organic polymers having an asymmetric, extremely thin (5-micron) surface layer or skin and a porous substructure of the same material. The total membrane thickness is only 6 to 8 mils; consequently, to handle the 20 to 50 psi used in water treatment, the membranes are reinforced for added mechanical support. Separations take place at the membrane surface, not within the substructure. (See also W74-09633) (Knapp-USGS)
W74-09636

PUBLIC WATER SUPPLIES IN THE SEATTLE-TACOMA URBAN COMPLEX AND ADJACENT AREAS, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 7C.
W74-09640

WASTEWATER RECLAMATION: SOCIO-ECONOMICS, TECHNOLOGY, AND PUBLIC ACCEPTANCE.
Ralph Stone and Company, Inc., Los Angeles, California.
For primary bibliographic entry see Field 5D.
W74-09662

CHEMISTRY OF MODERN WATER CHLORINATION, I, INTRODUCTION, II, THE CHEMISTRY OF CHLORINATION,
Newcastle and Gateshead Water Co., Newcastle-upon-Tyne (England).
For primary bibliographic entry see Field 5D.
W74-09744

CHEMISTRY OF MODERN WATER CHLORINATION, III, DISINFECTION BY CHLORINE, IV, CHLORINATION OF WASTEWATER AND INDUSTRIAL WATERS,
Newcastle and Gateshead Water Co., Newcastle-upon-Tyne (England).
For primary bibliographic entry see Field 5D.
W74-09745

MERCURY REMOVAL BY CONVENTIONAL WATER-TREATMENT TECHNIQUES,
National Environmental Research Center, Cincinnati, Ohio. Water Supply Research Lab.
G. S. Logsdon, and J. M. Symons.
Journal of the American Water Works Association, Vol 65, No 8, p 554-562, August 1973. 18 fig, 19 ref.

Descriptors: *Mercury, *Water treatment, *Water purification, *Potable water, Laboratory tests, Inorganic compounds, Organic compounds, Testing procedures, Water quality, Coagulation, Filtration, Water softening, Adsorption, Activated carbon, *Ohio River.

Three types of water were used in a study of mercury removal using techniques now employed by many water-treatment plants: raw Ohio River water, treated Ohio River water, and untreated ground water. Mercuric chloride or methyl mercury chloride was added in solution. Coagulation, turbidity removal, carbon adsorption, bentonite adsorption, softening and sand filtration were tested for Hg removal. Removal of mercury by all methods except activated carbon was more efficient when the mercury was in the inorganic form. The relationship between removal of mercury by turbidity removal, coagulation and softening suggests a major role for adsorption of mercury onto suspended matter in the removal of mercury from water. In the case of low turbidity, ferric sulfate was more effective than alum coagulation. Removal by coagulation and softening showed little dependence on mercury concentration in the range 3-16 micrograms/l. Removal by activated carbon adsorption was a function of powdered carbon dose. As long as raw water mercury levels remain low, existing technology should be adequate for removing mercury. (Jernigan-Vanderbilt)
W74-09773

REMOVAL OF ARSENIC (V) FROM WATER BY ADSORPTION ON ALUMINUM AND FERRIC HYDROXIDES,
Illinois Univ., Urbana. Dept. of Civil Engineering.
J. H. Gulledge, and J. T. O'Connor.
Journal of the American Water Works Association, Vol 65, No 8, p 548-552, August 1973. 3 fig, 6 tab, 15 ref.

Descriptors: *Arsenic compounds, *Water pollution, *Water treatment, *Adsorption, Laboratory tests, Coagulation, Toxins, Iron compounds.
Identifiers: *Alum, *Ferric hydroxide.

Arsenic removal from drinking water at water-treatment plants was observed as a function of pH and coagulant dose. The experimental results, expressed as the percentage removal of arsenic (V), showed the arsenic adsorption on ferric hydroxide exceeds the adsorption on aluminum hydroxide. In both cases, increased coagulant dosage resulted in increased arsenic removal. The results also indicated that arsenic removal is somewhat pH dependent. Although there was little difference in arsenic removals at the lower pH reactions, a noticeable decrease in removal was observed at pH 8.0 for both ferric and aluminum coagulants. It appears that the pH became important because of the change in the ionic form of the arsenic (V). Sources and the influence of arsenic as a nutrient and as a poison are discussed. (Jernigan-Vanderbilt)
W74-09775

STUDY OF ARSENIC REMOVAL FROM DRINKING WATER,
Taiwan Inst. of Environmental Sanitation, Taipei. Water Quality Control Section.
Y. S. Shen.
Journal of the American Water Works Association, Vol 65, No 8, p 543-548, August 1973. 1 fig, 21 tab, 7 ref.

Descriptors: *Arsenic compounds, *Water pollution, *Public health, *Water purification, Contaminants, Deep wells, Laboratory tests, On-site tests, Potable water, Heavy metals.

The content of arsenic (0.6-2.0 mg/l) in the drinking water in some parts of Taiwan has been linked to black-foot disease. Lab experiments including plain sedimentation, ion exchange, coagulation, oxidation and coagulation, and filtration tests showed that if arsenic-containing water is oxidized with chlorine, coagulated with ferric chloride, and then filtered, the finished water can be kept free from arsenic for a long period without saturating the filter medium. Field experiments were as follows: (1) raw water was aerated, allowed to settle, and filtered, (2) raw water was aerated, dosed with alum coagulant, allowed to settle, and filtered, (3) same as Exp. 2, but ferric chloride was substituted for alum, (4) same as Exp 3, but chlorine was added during aeration. The fourth field experiment produced an arsenic-free finished water. Based on the results of these experiments, a water plant was built to serve 1500 people. The plan contains an aeration tower, a mixer, a sedimentation tank, two slow sand filters, a storage tank, an elevation tank and a sand washing basin. (Jernigan-Vanderbilt)
W74-09776

5G. Water Quality Control

DESIGN OF PROTOTYPE MASS MEDIA PROGRAMS FOR TESTING IN THE LOWER JAMES RIVER BASIN,
Gates (W. E.) and Associates, Inc., Fairfax, Va.
For primary bibliographic entry see Field 6B.
W74-09252

REPORT ON GREAT LAKES WATER QUALITY FOR 1972.
International Joint Commission-United States and Canada.
1973. 30 p, 1 map.

Descriptors: *International Joint Commission, *Federal government, *Grear Lakes, *Water quality, Water quality control, Legal aspects, Waste water treatment, Water pollution treatment, Administration, Budgeting, Water resources, Decision making, Eutrophication, Water pollution effects, Social aspects, Phosphorous, Regulation, Project planning, Specifications, Foreign countries, United States, Canada.

The international commission on Great Lakes water quality could not fully discharge their assigned responsibilities under the agreement until each country gave adequate and timely support. Canada has delayed staffing whereas the United States has provided insufficient funding. The Canada-Ontario agreement for municipal waste treatment will meet the Canadian obligation for water quality control. The U.S. will meet its obligations only if larger monetary allotments are made. The commission recommends that each government accelerate the enforcement of industrial waste treatment programs and concludes that the limitations on phosphorous in detergents and programs for phosphorous elimination at treatment plants have already resulted in the reduction of phosphorous loadings to the lower lakes. This is noteworthy because of the key role phosphorous plays in causing eutrophication. The commission urges that responsible officials in both countries formulate programs to ensure the provision of adequate receiving, pump-out, facilities for pleasure and commercial vessels. Though further degradation of water quality may have been slowed, there is no scientific basis to judge the extent of the improvement except in localized areas. (Sperling-Florida)
W74-09257

ENVIRONMENTAL STATEMENTS--ENGINEER REGULATIONS ON PREPARATION AND COORDINATION.
Corps of Engineers, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-09258

CLEAN WATER--A CHALLENGE TO THE NATION, HIGHLIGHTS AND RECOMMENDATIONS OF THE NATIONAL CONFERENCE ON WATER POLLUTION.
Public Health Service, Washington, D.C.
Public Health Service Publication No 816 (December 1960). 48 p, 16 photo.

Descriptors: *Water pollution, *Water pollution control, *Water quality, *Water quality control, *Conferences, Water pollution treatment, Water pollution effects, Water pollution sources, Water resources, Regulation, Water resources development, Governments.

In 1960, President Eisenhower called together the National Conference on Water Pollution to discuss and evaluate the problems facing the nation in the area of water pollution and to make recommendations on how to meet those problems. Highlights of the Conference are presented. Four panel groups were established to study four basic areas of concern in the field of water pollution. These areas were: the effect of pollution on the Nation's health, welfare and economy; the importance of water pollution control on the management of water resources; the responsibilities of government, industry, agriculture and the public in combating pollution; and the need for research and professional training. Excerpts from the reports of each panel are presented along with the remarks of various persons who addressed the Conference. The recommendations of the Conference are outlined. (Flowers-Florida)
W74-09260

REPORT OF PROCEEDINGS CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN NORTH CAROLINA, SECTION III, KINSTON PUBLIC HEARING MARCH 1, 1973.
North Carolina Board of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 4A.
W74-09275

REPORT OF PROCEEDINGS CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN NORTH CAROLINA, SECTION II, SOUTHERN PINES PUBLIC HEARINGS NOVEMBER 2, 1972.
North Carolina Board of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 4A.
W74-09276

PRINCIPLES AND STANDARDS FOR PLANNING WATER AND RELATED LAND RESOURCES.
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-09278

PRINCIPLES AND STANDARDS FOR PLANNING WATER AND RELATED LAND RESOURCES (FINAL ENVIRONMENTAL STATEMENT).
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-09279

UTAH ENVIRONMENTAL PROBLEMS AND LEGISLATIVE RESPONSE: PART 1,
Environmental Protection Agency, Denver, Colo. Region VIII.
J. W. Raisch.
Utah Law Review, Winter 1972, p 479-490. 90 ref.

Descriptors: *Utah, *Rivers, *Lakes, *Water quality control, *Waste water treatment, Waste water disposal, Environmental sanitation, Aesthetics, Social aspects, Farm wastes, Return flow, Water pollution sources, Water conservation, Water sources, Water supply, Municipal wastes, Industrial wastes, Turbidity, Water pollution effects, Water quality, Recreation, Waste water(Pollution), Population.
Identifiers: Hazardous substances(Pollution).

The most significant environmental problem facing Utah is derived from population growth and urbanization. Utah's major water quality problems are pollution of several rivers and lakes, including the Great Salt Lake, each basically caused by expanding population and industry. Most usable water originates in the mountains and as it flows it becomes subject to degradation by agricultural and recreational activities. Twenty-two waste treatment plants discharge domestic waste water from 650,000 persons. The most salient problems are caused by organic materials being discharged by overloaded and poorly operated municipal waste water treatment plants. Oil, farm wastes, and a low flow are compounding the problem. Utah Lake suffers from turbidity which is attributable to shallowness and domestic and industrial discharges. Agricultural return flow is a contributing factor. Nine waste water treatment plants and three industrial plants are also discharging into the lake. One-hundred and fifty square miles of the lake do not meet 1978 water quality standards. (Sperling-Florida)
W74-09282

PROTECTING AMERICA'S ESTUARIES: FLORIDA (PART 2).
Hearings---Subcomm of the Comm on Government Operations, U.S. House of Representatives, 93d Cong, 1st Sess, May 26, 1973. 672 p.

Descriptors: *Water resources development, *Environmental effects, *Estuaries, *Ecology, *Pollution abatement, *Florida, Economics, Saline water-freshwater interfaces, Estuarine environment, Environmental engineering, Water quality, Water pollution, Water pollution effects, Legislation, Water demand.
Identifiers: *Congressional hearings.

The first portion of the hearings consisted of testimony from witnesses from Federal, State and local levels of government and the second was comprised of witnesses from private organizations, such as the Audubon Society, Sierra Club, and the Environmental Policy Center. Statements and testimony from various business men and concerned individuals, who feel the environment should be of primary concern, are included. Displeasure was expressed over federal legislation, and also over big business' attitude, concerning environment and ecology. Along with testimony, about 20 statements, and several letters were submitted for the record. Literature concerned with the prevention of oil spills from federally leased facilities in the Gulf and other Outer Continental Shelf areas is presented as is material submitted for the record by the private organizations in their testimony. (See also W74-06010) (Sutton-Florida)
W74-09283

AIR, LAND AND WATER POLLUTION.
For primary bibliographic entry see Field 6E.
W74-09289

DRAINAGE--SEWAGE DISPOSAL; CONTAMINATION OF LAKE MICHIGAN.
For primary bibliographic entry see Field 6E.
W74-09292

SANITARY DISTRICTS.
For primary bibliographic entry see Field 6E.
W74-09294

FISH PROTECTIVE REGULATIONS.
For primary bibliographic entry see Field 6E.
W74-09295

PROTECTION AND IMPROVEMENT OF WATERS: POLLUTION CONTROL.
For primary bibliographic entry see Field 6E.
W74-09300

SEDIMENTATION POLLUTION CONTROL ACT OF 1973.
For primary bibliographic entry see Field 6E.
W74-09303

CONTAMINATION OF WATERS.
For primary bibliographic entry see Field 6E.
W74-09304

RIGHT OF PRIVATE PARTY TO MAINTAIN ACTION TO ENFORCE PROVISIONS OF RIVERS AND HARBORS ACT OF 1899,
For primary bibliographic entry see Field 6E.
W74-09305

LIABILITY OF WATER SUPPLIER FOR DAMAGES RESULTING FROM FURNISHING IMPURE WATER,
For primary bibliographic entry see Field 6E.
W74-09306

A BILL TO AMEND THE OUTER CONTINENTAL SHELF LANDS ACT AND TO AUTHORIZE THE SECRETARY OF THE INTERIOR TO REGULATE THE CONSTRUCTION AND

OPERATION OF DEEPWATER PORT FACILITIES,
For primary bibliographic entry see Field 6E.
W74-09311

A BILL TO AMEND THE OIL POLLUTION ACT, 1961 (75 STAT. 402), AS AMENDED TO IMPLEMENT THE 1969 AND 1971 AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF THE POLLUTION OF THE SEA BY OIL, 1954, AS AMENDED; AND F OR OTHER PURPOSES,
For primary bibliographic entry see Field 6E.
W74-09312

A BILL TO ASSURE THAT THE PUBLIC IS PROVIDED WITH SAFE DRINKING WATER, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W74-09314

AUDUBON BLACK PAPER NUMBER 1, OIL POLLUTION,
For primary bibliographic entry see Field 5C.
W74-09315

RECENT FEDERAL LEGISLATION SIGNIFICANT IN ENVIRONMENTAL PLANNING PROGRAMS OF THE STATE OF TEXAS.
Texas Law Inst. of Coastal and Marine Resources, Houston.
For primary bibliographic entry see Field 6E.
W74-09316

SANITATION AND PUBLIC HEALTH PLANNING,
Escola Nacional de Saude Publica e de Medicina Tropical, Lisbon (Portugal).
H. X. A. Pedrosa.
An Esc Nac Saude Publica Med Trop. Vol 5, No 1/2, p 149-153. 1971.
Identifiers: Human population, *Planning, *Portugal, *Public health, *Sanitation, Sewer systems, Regulation, Waste disposal, Water quality standards.

In planning public health services in Portugal, the central government can subsidize and guide the local health departments. The district of state governments should determine the major outlines of sanitary policy, set up regulations and supervise the local agencies or health centers, which in the long run determine the effectiveness of the program. To handle the expanding need for public health services and new policies, the formation of a public health service company, by government and private sources, is suggested. It would be responsible for planning, building and operating water and sewer services in cooperation with local governments, and promoting research and technical, economic, sanitary and financial studies. The provision of water and sewer disposal are the most urgently needed services, since 78% of the population lives in rural areas and small communities which cannot afford the cost of building or operating such services. Of the total population of the country, 70% do not have piped water, 78% do not have public sewer systems, 22% do not have a bathrooms and 56% do not have toilets.--Copyright 1974, Biological Abstracts, Inc.
W74-09317

A SUMMARY-DIGEST OF FEDERAL WATER LAWS AND PROGRAMS,
National Water Commission, Arlington, Va.
For primary bibliographic entry see Field 6E.
W74-09318

TEST AND EVALUATION OF OIL POLLUTION ABATEMENT DEVICES FOR SHIPBOARD USE, PHASE 3,
Coast Guard, Washington, D.C. Naval Engineering Div.
L. B. Norton.
Available from NTIS, Springfield, Va 22151 AD-762 488 Price $3.00 printed copy; $1.45 microfiche. Phase 3 Final Report, January 1973. 16 p, 1 fig.

Descriptors: *Oily water, *Separation techniques, *Emulsions, *Oil pollution, Water pollution control, Water treatment, Waste water treatment, Filtration.

A separator system for oily water was tested for both bilge and ballast service on a 210 ft U.S. Coast Guard cutter. The capacity of the filter-coalescer system was 100 gpm. The effluent was monitored by an on-line infrared absorption type monitor. The alarm points were set to recirculate water effluents exceeding 20 mg per liter. Bilge mixtures were processed both at sea and in port. Normal water effluent oil concentrations were 12 to 20 mg per liter. Ballast mixtures were processed in port. A maximum of 5 mg per liter was discharged overboard during this procedure. Most emulsions were separated satisfactorily. The separated oil product from both bilge and ballast emulsions was used in the ship's main propulsion diesel engines and auxiliary boilers. (Knapp-USGS)
W74-09321

VACUUM DESORPTION CONCEPT FOR REMOVING OIL FROM WATER,
Mechanics Research, Inc., Los Angeles, Calif.
G. M. Pomonik.
Available from NTIS, Springfield, Va 22151 as AD-764 447, Price $4.25 printed copy; $1.45 microfiche. Final Report, to Coast Guard Office of Research and Development, March 1973. 107 p, 32 fig, 11 tab.

Descriptors: *Separation techniques, *Oily water, Water pollution control, Oil spills, Oil pollution, Bubbles, Flotation, Froth flotation, Gases, *Pollution abatement.
Identifiers: *Vacuum desorption.

A prototype working model was developed of a separator for the removal of oil from bilge and ballast water aboard ships and tanks. The concept involves desorption of gas from the water by means of a vacuum. The bubbles thus formed aid the separation process by forming on particles in the water and rapidly raising them to the surface. Tests include design, development and fabrication of a prototype unit to study the capabilities of the system with a variety of oil types and input conditions. The results were projected to a full scale shipboard installation. (Knapp-USGS)
W74-09323

UNDERGROUND INJECTION OF WASTEWATERS IN THE OHIO VALLEY REGION.
Ohio River Valley Sanitation Commission, Cincinnati. Committee on Subsurface Industrial Wastewater Injection,
Available from ORSANCO, 414 Walnut St, Cincinnati, Ohio 45202, Price $3.00 per copy. Ohio River Valley Water Sanitation Commission (ORSANCO) Report, August 1973. 63 p, 14 fig, 6 tab, 21 ref.

Descriptors: *Waste water disposal, *Injection wells, *Waste disposal wells, Ohio River, Indiana, Ohio, New York, Pennsylvania, West Virginia, Kentucky, Illinois, Hydrogeology, Regulation, Interstate commissions.
Identifiers: *Ohio River Valley.

Recommended administrative procedures for regulation of wastewater injection wells in the Ohio Valley are outlined. The geological and technological aspects to be considered in preparing and evaluating proposals, and for guiding the construction, operation and abandonment of injection systems are discussed. Areas where subsurface waste injection is indicated as being of only limited feasibility are those where no aquifers containing more than 1,000 mg/liter of dissolved solids are available; the saline-water-bearing sedimentary sequence is less than 1,500 ft thick; and structural geologic conditions are considered sufficiently complex to cause great uncertainty about subsurface hydrology. A foremost consideration in evaluating the feasibility of deep-well injection is the character of the untreated wastewater. Waste volumes should be small. Quantities greater than a few hundred gallons per minute are generally too great for injection into a single well in the Ohio Valley. (Knapp-USGS)
W74-09324

WASTE MANAGEMENT: GENERATION AND DISPOSAL OF SOLID, LIQUID AND GASEOUS WASTES IN THE NEW YORK REGION,
Regional Plan Association, N.Y.
B. T. Bower, G. P. Larson, A. Michaels, and W. M. Phillips.
A report of the Second Regional Plan, New York. March 1968. 107 p, 20 fig, 19 tab, photos, append.

Descriptors: *Waste disposal, *Alternate planning, Institutional constraints, Political aspects, Waste identification, Wastes, Waste treatment, Regulation, *Liquid wastes, *Solid wastes, *Gases, New York.
Identifiers: *Waste management, *New York City.

While specifically focusing on waste management in the 31-county New York Metropolitan Region, this report delineates a process for developing waste management policies applicable to any metropolitan area. The process has 4 steps: (1) projections of total population and employment for the Region to the year 2000; (2) selection of different distributions of total population, jobs, and other activities to show the impact of alternate settlement patterns; (3) selection of various 'generation conditions' to analyze the effects of factors contributing to waste production which yield assumed quantities of waste that will be generated; (4) choice of 'management conditions' to show the impact of different techniques and policies for handling and disposing of the generated wastes. Given this analytical framework, the costs and benefits of alternative policy proposals can be evaluated. It is concluded that, given comprehensive analysis of the entire waste management system (beginning with waste generation) and policy control over the entire region, projected waste quantities are manageable and do not seem so economically burdensome as to require efforts to limit population growth. Implications for governmental organization of waste management are also explored. (Hoffman-North Carolina)
W74-09353

WATER BALANCE IN SEWAGE STABILIZATION LAGOONS,
North Dakota Univ., Grand Forks. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-09361

BIOLOGY, DISTRIBUTION, IMPORTANCE AND CONTROL OF DEER FLIES AND HORSE FLIES (DIPTERA:TABANIDE) IN WATER-ORIENTED RECREATIONAL AREAS,
Clemson Univ., S.C. Dept. of Entomology and Economic Zoology.
T. R. Adkins, Jr.
Available from the National Technical Information Service as PB-233 435, $5.50 in paper copy, $1.45 in microfiche. Report No. 42, South Carolina Water Resources Research Institute, Clemson, April 1974. 172 p, 40 tab, 88 fig, 18 ref. OWRR A-020-SC(14).

Descriptors: *South Carolina, *Insect control, Insect behavior, Recreation, *Insects, Control, Carbon dioxide, Distribution, *Diptera.
Identifiers: Tabanids, *Tabanidae, *Horse Fly, *Deer Fly, Biting flies, Insect Traps, Chrysops, Tabanus, Ultra-lot-volume.

A survey of biting flies affecting water-oriented recreation in South Carolina revealed that at least 114 species and subspecies of tabanids are present. A plastic canopy trap was devised for monitoring tabanid activity; these traps show promise as control agents in small areas (i.e., around swimming pools). Temporary control of tabanids was obtained with malathion applied either by airplane or by ULV ground equipment. Short-term control was obtained because of fly-in or emergence of new flies. Carbon dioxide was a very efficient attractant for tabanids. Several types of plastic and wood traps were tested for their ability to capture tabanids. The plastic canopy trap with a black decoy sphere captured more of a greater variety of tabanid species than the other traps.
W74-09363

HYDROGEOLOGY OF THE FORMATION AND NEUTRALIZATION OF ACID WATERS DRAINING FROM UNDERGROUND COAL MINES OF WESTERN MARYLAND,
Geological Survey, Parkville, Md.
For primary bibliographic entry see Field 5B.
W74-09369

HELICOPTER TOW TESTS OF THE U.S. COAST GUARD'S AIR DELIVERY CONTAINER FOR OIL SPILL CONTAINMENT BARRIER,
Naval Coastal Systems Lab, Panama City, Fla.
J. R. Kennedy.
Available from NTIS, Springfield, Va. 22151, as AD-774 898, Price $3.00 printed copy; $1.45 microfiche. Informal Report NCSL 198-73, December 1973. 18 p, 5 fig, 2 append. MIPR: Z-70099-4-41543.

Descriptors: Oil spills, *Oily water, Water pollution control, *Oil pollution, Aircraft, *Separation techniques, *Pollution abatement.
Identifiers: *Oil spill barriers, Helicopters.

An oil spill barrier with its air delivery packing container was successfully towed by a Navy H-53 tow-equipped helicopter. Flight tow tests were conducted to demonstrate feasibility, develop any required special equipment, and provide data for similar Coast Guard tests. (Knapp-USGS)
W74-09374

ENVIRONMENT: A NEW FOCUS FOR LAND-USE PLANNING.
National Science Foundation, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-09412

ECOLOGICAL CONCEPTS AND APPLICATIONS TO PLANNING,
Michigan State Univ., East Lansing. Dept. of Zoology.
For primary bibliographic entry see Field 6B.
W74-09418

AN EVALUATION OF THE IMPACT OF LAND USE ON ENVIRONMENTAL QUALITY,
Argonne National Lab., Ill. Center for Environmental Studies.
For primary bibliographic entry see Field 4A.
W74-09419

AN OBJECTIVE WATER QUALITY INDEX,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
R. D. Harkins.
Journal Water Pollution Control Federation, Vol 46, No 3, p 588-591, March 1974. 1 tab, 2 ref.

Descriptors: *Statistical methods, *Water quality standards, Data processing, Mathematical studies, Water analysis, Analysis, Probability, Water pollution.
Identifiers: *Water quality index.

An objective statistical procedure for combining several water quality parameters to arrive at a water quality index is described. These indexes are directly comparable and may be plotted to show time trends or station differences or analyzed statistically to obtain probability levels. The index is suitable for summarizing water quality and determining overall trends, but it does not replace careful analysis of individual parameters to determine potential sources of pollution problems. (Witt-IPC)
W74-09436

FULL-SCALE HARVEST OF AQUATIC PLANTS: NUTRIENT REMOVAL FROM A EUTROPHIC LAKE,
North Dakota Univ., Grand Forks. Dept. of Biology.
S. A. Peterson, W. L. Smith, and K. W. Malueg.
Journal Water Pollution Control Federation, Vol 46, No 4, p 697-707, April 1974. 5 fig, 6 tab, 27 ref.

Descriptors: Aquatic plants, *Aquatic weed control, *Municipal wastes, Water pollution effects, *Phosphorus, *Nutrient removal, Lakes, Harvesting, Water quality control, *Eutrophication, Water chemistry, Water quality, Water pollution, *Minnesota, Water pollution sources, Waste water(Pollution).
Identifiers: *Lake Sallie(Minn), Detroit Lakes(Minn).

A study was made of the nutrient input and content of Lake Sallie, Minnesota. The prime nutrient source to the lake was pinpointed as the waste water outfall from the city of Detroit Lakes, Minn. After determining the nutrient balance for the lake, aquatic plants were harvested for 3 months from the entire littoral zone of the lake. A reevaluation of the nutrient balance of the lake was made to determine the effects of aquatic plant harvesting. The study showed that a full-scale harvesting program was not sufficient to offset the high phosphorus loading in the lake. The harvesting program was able to remove only 1.37% of the total phosphorus input to the lake. (Witt-IPC)
W74-09438

AQUATIC MIDGE LARVICIDES, THEIR EFFICACY AND RESIDUES IN WATER, SOIL, AND FISH IN A WARM-WATER LAKE,
California Univ., Riverside. Dept. of Entomology.
M. S. Mulla, R. L. Norland, W. E. Westlake, B. Dell, and J. St. Amant.
Environ Entomol, Vol 2, No 1, p 58-65, 1973, Illus.
Identifiers: *Aquatic insects, Carbaryl, Chironomus, Chlorpyrifos, Cricotopus, Dicrotendipes, Fenitrothion, Fish, Lakes, *Larvicides(Midges), *Midges, Soils, Tanypus, *California.

To study the efficacy of chemical larvicides, several materials were evaluated in 2 warm-water southern California artificial lakes, (lake Calabasas and Westlake), and the residues of an effective larvicide (chlorpyrifos) in various components of 1 of the lakes were investigated. Abate (O,O'-(thiodi-p-phenylene) O,O,O', O'-tetramethyl phosphorothioate) gave excellent control of Chironomine midges, but only poor control of the smaller Tanypodine midges. Carbaryl yielded poor control of both groups, and fenitrothion yielded good control of both groups at a higher rate of application. Chlorpyrifos at 0.2 lb active ingredients per acre-surface yielded complete control of Chironomine midges for 12 wk or longer, but suppressed the Tanypodine larvae for only 7-8 wk. Residues of chlorpyrifos were generally higher in the bottom water, even though maximum residues in both layers reached 0.6 ppb. Residues were much higher in the mud, reaching a mean maximum of 0.3 ppm in the top 1-inch section of mud samples, but only traces were found in the remaining mud. Maximum residues in water were obtained one day after treatment, declining to below 0.1 ppb within 4 wk after treatment. The maximum residues in the mud were obtained 1 wk after treatment, declining to below 0.1 ppm in 28 days. Slightly higher levels of residues were found in water and mud when the whole lake was treated. Bottom-dwelling and -frequenting fish, such as channel catfish and, to some extent, black crappie contained much higher quantities of chlorpyrifos than the nonbottom dwelling fish such as largemouth bass and bluefill. Mean maximum residues in channel catfish and black crappie were 0.8 and 0.5 ppm after 3 and 2 wk posttreatment, respectively, declining to barely detectable levels 25 days after treatment. The residues in largemouth bass and bluegill were minimal, with maximum approaching 0.2 ppm but remaining 0.1 or below this level most of the time.--Copyright 1973, Biological Abstracts, Inc.
W74-09443

CLEANING UP: PAPER INDUSTRY'S MESS,
J. Josephson.
Environmental Science and Technology, Vol 8, No 1, p 22-24, Jan, 1974. 1 fig, 2 tab.

Descriptors: *Pollution abatement, *Pulp and paper industry, *Pulp wastes, *Water pollution control, *Air pollution, *Water quality standards, *Legal aspects, *Regulation, *United States, *Legislation, Water quality act, Federal Water Pollution Control Act, Effluents, Costs, Capital costs, Operating costs, Waste water treatment, Water quality control, Industrial wastes, Waste water(Pollution), Water pollution sources.

The major water pollutions discharged by the U.S. pulp and paper industry are listed and their origins are indicated. While the EPA is preparing new effluent guidelines for aqueous emission control, regulations set forth in the 1972 Amendments to the Federal Water Pollution Control Act require all existing mills to use the best practicable control technology available by July 1977 and the best available technology economically achievable by July 1983, with a zero-discharge goal set for 1985. Air emission standards about to be formulated will probably resemble those already prepared for Europe's paper industries. Methods of reducing water and air pollution loads issuing from pulp and paper mills are summarized, and the marketing of by-products to help recovery part of the effluent-treatment costs is discussed. Interim standards for limiting water pollutants are presented, and water pollution abatement expenditures for various kinds of mills through 1980 are estimated. (Buchanan-IPC)
W74-09458

DISCHARGE COEFFICIENTS OF FLOAT-AREA-TYPE FLOW METERS,
Tokyo Science Univ. (Japan).
For primary bibliographic entry see Field 2E.
W74-09480

COMPUTER DATA FLOWS SMOOTHLY FOR SMALL WATER AUTHORITY,
Monroeville Water Authority, Pa.
For primary bibliographic entry see Field 6C.
W74-09483

NUTRIENTS AND AQUATIC VEGETATION EFFECTS,
New York State Dept. of Health, Albany. Div. of Labs. and Research.
For primary bibliographic entry see Field 5C.
W74-09498

OME HISTORICAL STATISTICS RELATED O FUTURE STANDARDS,
Visconsin Univ., Madison.
or primary bibliographic entry see Field 5D.
74-09505

OME PRACTICAL ASPECTS CONCERNING HE USE OF THE MOLLUSCICIDE N-TRITYL-IORPHOLINE (FRESCON) FOR THE CON-ROL OF FASCIOLIASIS,
hell Research Ltd., Sittingbourne (England). Voodstock Agricultural Research Centre.
or primary bibliographic entry see Field 5C.
74-09525

IGGING INTO MINE WASTE.
or primary bibliographic entry see Field 5B.
74-09531

OAD SALT, DRINKING WATER AND AFETY,
ittle (Arthur D.), Inc., Cambridge, Mass. Public ffairs Center.
or primary bibliographic entry see Field 4C.
74-09537

REVENTING LANDFILL LEACHATE CON-AMINATION OF WATER,
ulf South Research Inst., Baton Rouge, La.
J. Wren.
vailable from the National Technical Informa-on Service as PB-222 468, $4.25 in paper copy, .45 in microfiche. Environmental Protection gency, Cincinnati, Ohio, Report EPA-670/2-73-1, July 1973. 113 p, 37 fig, 10 tab.

escriptors: Pollution, Industrial wastes, *Tests, Vaste disposal, Water pollution, Surveys, anitary engineering, Sealers, Soil properties, mpling, Contamination.
entifiers: Solid waste disposal, Resource covery, Commercial materials, *Sanitary landfill alants, Synthesized garbage-simulating, eachate, Test pits, *Municipal refuse.

vailable commercial materials and industrial aste products that could possibly be used as sani-ry landfill sealants were tested in elemental test lumns (with the use of synthesized garbage) that mulated field conditions. These materials were en applied to small field test pits filled with mu-cipal garbage. The test pits were equipped with mpling wells, within and around each pit, to onitor any leachate which escaped from the lls. The analytical parameters (BOD, COD, and hers) were compared with baseline data obtained om local area wells to determine the degree of ef-ctiveness of the test materials. (Martino-WWA)
74-09539

NIVERSITY STUDENTS IMPLEMENT UBLIC POLICY RURAL COMMUNITY AC-ON WITH A WATER DEVELOPMENT PRO-CT,
se Western Reserve Unit., Cleveland, Ohio. rban and Environmental Studies.
G. Montgomery.
ater Resources Bulletin, Vol 9, No 6, p 1258-65, 1973. 3 ref. HUD P-299-9217 (CWRU).

escriptors: *Rural areas, *Financing, *Water pply, Sewage treatment, Government finance, cal governments, Federal government, State vernments, *Ohio.
entifiers: *Rock Creek(Ohio).

r more than ten years the small rural village of ck Creek, Ohio has sought state and federal ancial assistance to improve its water and wage facilities. The existing water system is thout filters and is not metered. The activities of e village and of eight student members of the Urban and Environmental Studies Program at Case Western Reserve University in a ten-week seminar in their search for financial assistance are described. The impact of the village's small size, the characteristics of its population, its choice to remain incorporated, its isolation from major transportation routes, its inability to raise funding shares as required by governmental programs and its present indebtedness on its ability to qualify for state and federal programs are examined. Recommendations for future financial assistance are presented. It was also recommended that greater communication between the state governmental agencies and local communities be fostered, a government information clearing house be established, increased research into alternative governmental solutions to rural problems and an ombudsman be established to aid communication. (Schroeder-Wisconsin)
W74-09557

CAPITAL BUDGETING FOR POLLUTION CONTROL,
A. D. Mikhail.
Journal of General Management, Vol 1, No 1, p 32-44, 1973. 15 tab, 7 ref.

Descriptors: *Budgeting, *Pollution abatement, *Industrial wastes, *Cost-benefit analysis, Capital costs, Monetary benefits, Investment, Industries, Oil industry, Pulp and paper industry, Electric power industry, Steel, Economic justification.
Identifiers: Accounting procedures, Capital expenditures.

Capital budgeting practices to achieve pollution control are examined for the electric utility, steel, integrated domestic oil, and paper and pulp industries. The industrial sample was selected from firms listed in Fortune's Directory of the 500 largest corporations and in Standard and Poor's 'Industrial Survey' with questionnaires submitted to the selected firms' chief financial officers. Of 146 questionnaires sent 27, 8, 11, and 13 responses, respectively, were returned. The distribution of industry respondents are categorized by the 1970-72 relative size of pollution control expenditures, relative size of capital expenditures and reported length of the pollution control project's useful life. Results from the survey indicate that some industries can identify and measure a number of pollution abatement benefits including higher production yields and additional saleable byproducts. For the electrical industry, reduced litigation costs were also cited. Respondents, excluding steel, indicated that abatement benefits tended to be long run in nature. Less certain benefits--improved corporate image and workers' morale--were also noted. While a majority of respondents concluded that traditional cost-benefit analysis is inadequate in selecting abatement procedures, a resonable number utilized the cost-benefit analysis in varying degrees while still placing major emphasis on executive judgement. (Schroeder-Wisconsin)
W74-09558

EFFLUENT CHARGES: A CRITIQUE,
Pennsylvania Univ., Philadelphia. Wharton School.
S. Rose-Ackerman.
Canadian Journal of Economics, Vol 6, No 4, p 512-528, 1973. 5 fig, 20 ref.

Descriptors: *Pollution taxes(Charges), *Effluents, *Decision making, Water pollution control, Regulation, Marginal costs, Marginal benefits, Cost allocation, Waste treatment, Progressive taxes, Regressive taxes, Payment.

The many arguments favoring the imposition of effluent charges to control pollution often are the result of reliance upon models that do not consider the complexity of the real world problems faced by decision makers. When such complexities are operationalized into the earlier models it can often be shown that comparable non-market regulations may be at least as efficient as effluent charges. Among the real world complexities evaluated are cost of information, intensity of pollution investment, collusive behavior among dischargers, discontinuities in marginal cost and benefit schedules, the existence of differing marginal damage functions among pollutors, and cases when joint treatment by dischargers may result in an efficient outcome. Under effluent charges it is shown that some dischargers may be forced out of business, even though their operation may be justified when comparing marginal social costs and benefits, joint treatment facilities may be located in the 'wrong' place, and long term adjustment periods may lead to continued over or under treatment. While it is conceded that non-market schemes often face more difficult problems, it is equally important to realize that effluent charges do not represent a panacea. (Schroeder-Wisconsin)
W74-09560

CONTROLLING POLLUTION BY PRICE AND STANDARD SYSTEMS: A GENERAL EQUILIBRIUM ANALYSIS,
Williams Coll., Williamstown, Mass.
T. H. Tietenberg.
Swedish Journal of Economics, p 193-203, 1973. 12 ref.

Descriptors: *Pollution abatement, *Equilibrium, *Standards, Prices, Economic efficiency, Welfare(Economics), Pollution taxes(Charges), Control, Resource allocation.

The high information requirements to establish an optimal level of pollution has prompted several economists to accept the setting of pollution levels through the political process. Once the level has been decided the pricing system could be used to allocate the accepted pollution levels among polluters. The case for using the pricing system, either through an auction of pollution rights or through a specific tax depends upon an assumption that a single per unit tax on each type of waste discharge will provide a least-cost solution. The validity of this assumption is tested through a simple mathematical model. The analysis concludes that the theoretical case for a price and standard system rests upon the low transaction costs associated with a uniform tax structure. A uniform tax, however, minimizes the costs of attaining a given standard only when the marginal physical product of a particular pollutant is the same for all emitters, a most unlikely situation. If the area can be broken into zones, this assumption may be justified. The optimal number of zones will be obtained when the marginal transaction costs of administering one more zone equals the marginal gains in resource cost reduction. (Schroeder-Wisconsin)
W74-09561

POLLUTION CONTROL: NEW METHOD OF FINANCING,
Rothschild (L.F.) and Co., N.Y.
R. H. Aldrich, and N. A. Eisner.
Financial Executive, Vol 41, No 10, p 118, 120-121, 1973.

Descriptors: *Pollution abatement, *Financing, *Industries, Bond issues, Capital supply, Taxes.
Identifiers: Pollution control revenue bonds.

An important element in the development of any industrial pollution abatement program is the consideration of financing formats. A full consideration of alternative formats can lead up to a 30% reduction in cost. The newest and most promising financial alternative available is the pollution control revenue bond which in the past 12 months has raised $1 billion of abatement funds. These bonds are successors to the industrial development bond which had aided communities in encouraging industrial development by issuing low-cost tax-exempt revenue bonds. The pollution control bond

has improved local environments, provided low-cost capital, and minimized the economic impact of increased pollution standards on communities. Positive impact on the cost of money, cash flow, internal earning objectives, and availability of funds are indicated. Legislation which allows this form of financing has been or is expected to be enacted in 48 states. The Internal Revenue Service regulation may limit the effectiveness of this financing alternative as presently it limits the bonds' revenue to financing of abatement facilities, collection, storage, reclamation, or disposal of solid wastes. The eligibility requisites for these bonds are outlined. (Schroeder-Wisconsin)
W74-09563

ENVIRONMENTAL DISRUPTION: IMPLICATIONS FOR ECONOMIC PLANNING,
For primary bibliographic entry see Field 6B.
W74-09564

GROUNDWATER QUALITY. DOOR COUNTY, WISCONSIN.
Wisconsin Univ., Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 5B.
W74-09565

THE COASTAL INTERCEPTOR WATERWAY,
Miami Univ., Fla.
D. C. Tabb, and E. J. Heald.
Sea Grant Coastal Zone Management Bulletin No 4, January 1973. 10 p, 3 fig, 5 ref. NOAA Sea Grant No 2-35147.

Descriptors: *Water pollution control, *Canals, Florida, Wetlands, Salt marshes, Coasts, Lagoons, Planning, Land use, Urbanization.

To control pollution of coastal wetlands, wide shallow waterways are proposed to intercept nutrients. The interceptor waterway would be unlike traditional coastal development canals. They should be approximately parallel to coastal contours instead of directly into coastal bays. They are designed to intercept and digest upland nutrients irrespective of tide using sunlight, photosynthesis by plants and wind action to eliminate severe eutrophication, stratification, and oxygen depletion. Tidal exchange should not be considered an important facet of the system. The waterways should have a relatively large surface-to-depth ratio, averaging 5 ft or less in depth. Its seaward shore should be completely natural with a few easily hidden structural safeguards built to preserve uniform height of the seaward edge or sill. The waterways should serve best in coastal areas having very low relief and should function equally well in salt-tolerant grass marshes of the south Atlantic and Gulf states or mangrove marshes of Florida. (Knapp-USGS)
W74-09614

INDEPENDENT COMPARISON OF THREE URBAN RUNOFF MODELS,
Monash Univ., Clayton (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-09629

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SURFACE MINE SPOIL TREATED WITH FLY ASH,
Northeastern Forest Experiment Station, Princeton, W.Va.
For primary bibliographic entry see Field 5B.
W74-09631

OPTIMAL CONTROL OF FLOW IN COMBINED SEWER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-09652

URBAN PUBLIC POLICY AND POLITICAL INSTITUTIONS FOR WATER QUALITY MANAGEMENT ON LAKE ERIE: YEAR TWO,
Battelle Columbus Lab., Ohio.
D. L. Hessel.
Available from the National Technical Information Service as PB-233 752, $7.50 in paper copy, $1.45 in microfiche. Completion Report, May 24, 1974. 298 p, 6 fig, 13 tab, 150 ref. 4 append. OWRR C-3382(No 9001)(1).

Descriptors: *Cities, Coordination, *Governmental interrelations, *Institutional constraints, *Lake Erie, Methodology, Municipal wastes, *Organizations, *Management, *Water policy, *Water pollution, Administrative agencies, Administrative decisions, Analysis, Decision making, Federal government, Governments, Great Lakes, Institutions, Legal aspects, Local governments, Management, *Ohio, Political aspects, Political constraints, Regulation, State governments, Suburban areas, United States, Water quality control.
Identifiers: *Institutional analysis, Longitudinal analysis, Waste water management, *Cleveland(Ohio).

The need for a systematic methodology for analysis of institutional systems has been recognized by political scientists. The development of such a methodology, however, has not been possible in the absence of a logically consistent theoretical framework. A multilateral theory recently formulated by Phillip M. Gregg was used as an analytical framework. The theory was employed to identify useful research variables, to derive critical research questions, and to provide explanatory generalizations. This study focused on the system of institutions responsible for waste water management in the Cleveland, Ohio, metropolitan region. The approach was to observe changes in the several research variables over a period of ten years (1963-1973) through use of a longitudinal design. Data were collected in interviews held in 1971 and 1973. The principal variables described institutional structure, institutional products, and institutional performance. The study demonstrated that the multilateral theory is a useful framework for explaining observed institutional phenomena. Accepting the theory on this evidence as an accurate description of real world relationships and principles, the theory was used as a normative tool to suggest directions for future development of the institutions concerned with waste water management for the Cleveland metropolitan area.
W74-09653

WATER RESOURCE PROBLEMS AND RESEARCH NEEDS OF NORTH CAROLINA - A REASSESSMENT,
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 6B.
W74-09657

MINIMIZING WATER AND SEWER SYSTEM COSTS USING TOPAZ,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 6A.
W74-09658

ECONOMIC IMPACT OF AGRICULTURAL POLLUTION CONTROL PROGRAMS,
Federal Reserve Bank of Kansas City, Mo.
R. J. Doll.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 9-16, (1972). 3 tab, 3 append.

Descriptors: *Agriculture, Technology, *Management, *Economic impact, *Control, *Regulation, Agricultural runoff, Kansas, Feedlots, Farm wastes.
Identifiers: *Agribusiness, Tenth Federal Reserve District.

Flexible regulatory systems governed by enlightened administrations are needed to replace existing uniform pollution control programs for agriculture. These systems should be viable and flexible enough to adequately control the environment without unduly restricting economic growth. An example is pollution caused by runoff of nitrogen-based fertilizers and other chemicals. Such runoff must be brought under control. The real problem is how to minimize such pollution but, at the same time, permit the efficiencies achieved by technology. The proposal that the amount of a given chemical used per acre should be limited seems an incorrect approach because of the influence of such variables as soil type, climate, topography, method, and time of application, and soil preparation tactics. (See also W74-09663) (Lynch-East Central)
W74-09665

PUBLIC RELATIONS ASPECTS OF AGRICULTURAL WASTE MANAGEMENT,
D. B. Graham.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 17-24, (1972).

Descriptors: *Farm wastes, *Waste treatment, *Recycling, Pollution abatement, Odor, Waste disposal.
Identifiers: *Public relations, *Agricultural Waste Managment.

An overview of animal waste management methods and economic implications is presented to show that the public must be informed about the farmer's pollution problems and solutions. There is a need for public acceptance of farm wastes as a valuable recyclable resource. (See also W74-09663) (Lynch-East Central)
W74-09666

IMPLICATIONS OF THE PERMIT PROGRAM IN THE POULTRY AND ANIMAL FEEDING INDUSTRY,
Environmental Protection Agency, Washington D.C. Office of Research and Monitoring.
D. F. Anderson.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 25-45, (1972), fig, 9 tab, 35 ref.

Descriptors: *Waste disposal, *Water pollution, treatment, *Water permits, *Feed lots, *Agricultural runoff, *Waste treatment, Water pollution, Water law, Waste water disposal, Livestock, Biochemical oxygen demand, Chemical oxygen demand, Poultry, Farm wastes.
Identifiers: Pollution discharge, Executive Order Number 11574, Zero discharge.

Now in suspension, Executive Order Number 11574 called for the Army Corps of Engineers to assume responsibility for issuing permits for all industrial pollution discharges into navigable streams and their tributaries. Permits for agricultural discharges into waterways were to apply to operations of 1000 animal waste units and larger with violators subject to fines and/or injunction. The proposed national goal was 'zero discharge' by 1985. New methods of meeting discharge requirements such as sedimentation, lagooning and recycling were proposed. Pollutant concentrations in run-off and water discharge as well as methods of disposing of animal wastes are cited. (See also W74-09663) (Lynch-East Central)
W74-09667

APPLICATION OF IOWA'S WATER POLLUTION CONTROL LAW TO LIVESTOCK OPERATIONS,
Iowa State Dept. of Health, Des Moines.
J. Agena.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 47-59, (1972).

Descriptors: *Regulation, Water law, *Water permits, *Water pollution control, *Farm wastes, *Livestock, *Feedlots, Iowa, Waste disposal, Waste treatment, Inspection, Poultry, Runoff.
Identifiers: Permit requirements, *Iowa Water Pollution Control Law, Rural Environmental Assistance Program(REAP).

In conjunction with the Agricultural Stabilization Conservation Service, the Soil Conservation Service, and the Cooperative Extension Service, the Iowa Water Pollution Control Commission became responsible for prevention, control, and abatement of water pollution in that state in 1965. The commission registers feedlots, evaluates feedlots for pollution potential, and issues permits for waste disposal. Requirements for feedlot registration and regulation based on the number of confined animals and the destination of the runoff water are defined and outlined. (See also W74-09663) (Lynch-East Central)
W74-09668

A REVIEW OF PUBLIC AND PRIVATE LIVESTOCK WASTE REGULATIONS,
Missouri Univ., Columbia.
D. R. Levi.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 61-69, (1972).

Descriptors: *Regulation, *Farm wastes, *Livestock, *Feed lots, *Zoning, *Civil law, Permits, Water pollution, Legal aspects, Contracts, Air pollution, Waste disposal, Pollution abatement.
Identifiers: Public regulation, Private regulation, Licensing law, Injunctions, Site selection.

All states now have very similar public regulatory agencies which control pollution by adhering to precise tolerance mandates. When tolerance levels are exceeded the board may seek an injunction, assess daily fines, institute a lawsuit to recover damages, or issue tax bills for construction of adequate pollution control facilities. Private regulation, uncertain and unpredictable due to dependence on a jury, occurs indirectly in civil lawsuits through the nuisance laws. Under these laws a plaintiff may sue for injunction, damages, or both. Feedlot operators were advised to consider zoning, site selection, and prior occupation in setting up new operations. (See also W74-09663) (Lynch-East Central)
W74-09669

IMPLICATIONS OF STATE ENVIRONMENTAL LEGISLATION ON LIVESTOCK WASTE MANAGEMENT,
Economic Research Service, Washington, D.C. Farm Production Economics Div.
J. B. Johnson, L. J. Connor, C. R. Hoglund, and J. A. Black.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 71-81, (1972). 4 tab, 7 ref.

Descriptors: *Economic efficiency, *Legislation, *Environment, *Livestock, Pollution abatement, Permits, Control, Confinement pens, Farm wastes.
Identifiers: *Waste management, Administrative codes, Legislative proposals, Registration criteria.

A 1971 survey of water quality statutes in 27 major beef-producing states revealed a mixture of general statutes, specific registry statutes, administrative codes, approval procedures, and permit systems applicable to livestock producers. Tables show percentages of beef produced in the states surveyed, the forms of state water pollution statutes applicable to livestock waste management, criteria for requiring registration of livestock and poultry production firms, and criteria for requiring registration or permits provided by general state water quality statutes. Implications of these statutes for both beef producers and society were broadly discussed. (See also W74-09663) (Lynch-East Central)
W74-09670

POTENTIAL CITIZEN INITIATED LEGAL ACTION AGAINST AGRICULTURAL POLLUTION,
West Virginia Univ., Morgantown. Div. of Resource Management.
D. Colyer, and D. R. Levi.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 83-95 (1972). 37 ref.

Descriptors: *Regulation, *Legal aspects, *Control, *Pollution abatement, *Common law, Discharge, Farm wastes.
Identifiers: Citizen initiated legal action, *Agricultural pollution, Mandamus, Class action, Constitutional provisions, Public trust doctrine.

Feasible individual or group action against pollution is outlined. Citizens may seek a judicial decree constraining administrators to perform environmentally-related duties, usually through mandamus, or bring direct suit against a polluter. Plaintiffs may sue polluters under nuisance laws, illustrating intentional and unpriviledged entry onto land, or under trespass laws, requesting an injunction, damages or both. They may also utilize class or declaratory judgement actions. The Refuse Act of 1899, the National Environmental Policy Act of 1969, and the ninth amendment to the Constitution have also guaranteed the rights of the individual to a clean environment. (See also W74-09663) (Lynch-East Central)
W74-09671

DAIRY FARMER CONCERNS OF LAWS AND REGULATIONS AFFECTING ANIMAL WASTE MANAGEMENT,
National Milk Producers Federation, Washington, D.C.
J. B. Adams.
In: Waste Management Research, Proceedings of the 1972 Cornell Agricultural Waste Management Conference, Ithaca, New York, p 97-100 (1972).

Descriptors: *Dairy industry, *Farm wastes, *Regulation, *Legislation, *Water pollution, Waste disposal, Permits.
Identifiers: *Waste management, *National Milk Producers Federation.

The National Milk Producers Federation has adopted an environmental issues policy which recognizes the need for reasonable balance between animal agriculture, costs to consumers, and future environmental quality. Dairymen face a problem in complying with conflicting federal regulations. According to the U.S. Public Health Service, in order to maintain a license to produce Grade 'A' milk, a dairy must regularly remove and deposit manure on the land. On the other hand, most water pollution regulations require a retention of the manure or other means of preventing animal wastes' entrance into public waters. Obviously, dairymen can't comply with both regulations at the same time. Many regulations also require a permit to discharge animal wastes into navigable waterways. This across the board approach fails to accommodate the flexibility required to enable producers to employ practical solutions to individual problems. (See also W74-09663) (Marquard-East Central)
W74-09672

AMERICAN COCKROACH FEEDING IN SEWER ACCESS SHAFTS ON PARAFFIN BAITS CONTAINING PROPOXUR OR KEPONE PLUS A MOLD INHIBITOR,
North Carolina State Univ., Raleigh.
C. G. Wright, H. C. McDaniel, H. E. Johnson, and C. E. Smith.
Journal of Economic Entomology, Vol 66, No 6, p 1277-1278, December, 1973. 1 tab, 2 ref.

Descriptors: *Sewers, Eradication(Pests), *Insect control, Attractants, Insects, *Pesticides, *Insecticides.
Identifiers: *Cockroach, Periplaneta americana, *Kepone, *Proxopur.

The control of the American Cockroach, Periplaneta americana, in sewer access shafts was investigated. Baits containing 0.125% Kepone (decachlorooctahydro-1,3,4-metheno-2H-cyclobuta(cd)pentalene-2-one) or 2 percent propoxur, with or without p-nitrophenol mold inhibitor, and embedded into paraffin cakes were placed in the infested shafts. Cockroaches did not feed on propoxur baits. Feeding occurred on some Kepone baits with and without mold inhibitor, but not after mold became visible. Addition of the mold inhibitor reduced the molding of propoxur and Kepone baits. There was a reduction in cockroach numbers in baited sewer access shafts; however, dead cockroaches were observed only in shafts containing Kepone baits with visible feeding signs. Cockroach numbers increased in shafts with paraffin check cakes. Baits in moist shafts increased in weight by absorbing ambient moisture, and disintegrated in humid shafts with high ambient temperatures. (Merritt-FIRL)
W74-09717

HYDRAULICS OF A WATER SUPPLY SYSTEM WITH FLUCTUATING WATER DEMAND, (HYDRAULIK EINES WASSERVERSORGUNGSSYSTEMS MIT FLUKTUIERENDEN BEDARFSMENGEN),
Karlsruhe Univ. (West Germany). Institut fuer Siedlungswasserwirtschaft.
For primary bibliographic entry see Field 8B.
W74-09726

INSTALLATION OF LARGE-DIAMETER FIBER-GLASS FLEXIBLE PIPE IN MUNICIPAL SYSTEMS,
Johns-Manville Corp., Denver, Colo.
For primary bibliographic entry see Field 8A.
W74-09727

ENGINEERING AND CONSTRUCTION PRACTICES FOR GRAY AND DUCTILE CAST-IRON PIPE,
Cast Iron Pipe Research Association, Oak Brook, Ill.
For primary bibliographic entry see Field 8B.
W74-09728

WATER POLLUTION PREVENTION IN SOUTH WALES,
Wales Directorate of Engineering (England).
H. Cronshaw.
Water Pollution Control, Vol 78, No 1, p 41-50, 1974. 4 fig, 2 tab.

Descriptors: *Water pollution control, *Waste water disposal, *Discharge(Water), Regulation, Watersheds(Basins).
Identifiers: *Wales(Seven Estuary-Bristol Channel).

Water pollution prevention in South Wales is particularly relevant in that the catchment area draining to the Severn Estuary and Bristol Channel contains almost two-thirds of the population of the

Principality and all its major industries. Rapid progress is being made to clean up the rivers of South Wales and there is a much greater awareness of the need for caution in discharging waste water. Pollution prevention measures have taken place within a general policy framework which is sufficiently flexible to meet future demands. (Sandoski-FIRL)
W74-09735

COST OF ACHIEVING E.P.A.'S BPCTCA AND ZERO DISCHARGE.
Paper Trade Journal, Vol 158, No 15, p 30-35, April 15, 1974. 3 fig, 6 tab.

Descriptors: *Economic impact, *Federal Water Pollution Control Act, *Pulp and paper industry, Water quality, Effluents, Operating costs, Capital costs, Mills, Energy.
Identifiers: *Amendments.

Highlights from an engineering estimate study of the cost of meeting selected Environmental Protection Agency national effluent limitation levels are presented. Operating costs for achieving zero pollutant discharge were estimated at $1.7 billion annually. An additional capital investment of $1 billion by the pulp and paper industry will be required to supplement its existing external effluent treatment facility to meet the proposed best practicable control regulations scheduled for 1977. The investment and operating costs for those mills on municipal sewage treatment and those costs associated with compliance to best practical control technology currently available (BPCTCA) are in addition to those estimates. The energy requirement is the single largest cost component of the total operating cost for zero discharge treatment for the pulp and paper industry. (Merritt-FIRL)
W74-09748

U.S. COAST GUARD OIL POLLUTION INVESTIGATION AND CONTROL SCHOOL.
Coast Guard, Yorktown, Va.
Available from NTIS, Springfield, Va 22151 as AD-758 511, Price $6.75 printed copy; $1.45 microfiche. Coast Guard RTC On-Scene Coordinator's Manual, November 1972. 278 p.

Descriptors: *Oil spills, *Water pollution treatment, *Federal government, Water pollution control, Oil pollution, Federal water pollution control act, Planning, Navigable waters.

This National Oil and Hazardous Substances Pollution Contingency Plan has been developed in compliance with the Federal Water Pollution Control Act. The plan provides for a pattern of coordinated and integrated response by Departments and Agencies of the Federal Government to protect the environment from the damaging effects of pollution spills. It also promotes the coordination and direction of Federal, State, and local response systems and encourages the development of local government and private capabilities to handle such pollution spills. The objectives of this plan are to provide for efficient, coordinated and effective action to minimize damage from oil and hazardous substance discharges, including containment, dispersal, and removal. The plan, including the annexes and regional plans, provides for: (a) assignment of duties and responsibilities, (b) establishment and identification of strike forces and emergency task forces, (c) a system of notification, surveillance and reporting, (d) establishment of a National Center to coordinate and direct operations in carrying out this plan, (e) a schedule of dispersants and other chemicals to treat oil spills, (f) enforcement and investigative procedures to be followed, (g) directions on public information releases and 9h) instructions covering on-scene coordination. (Knapp-USGS)
W74-09753

SALINITY CONTROL INTERIM REPORT FOR WATER SUPPLY AND WATER QUALITY CONTROL STUDY, BRAZOS RIVER BASIN, TEXAS.
Environmental Protection Agency, Dallas, Tex.
Available from NTIS, Springfield, Va 22151 as PB-227 057, Price $12.00 printed copy, $1.45 microfiche. Environmental Protection Agency Region VI Report, March 1973. 144 p, 20 fig, 19 tab, 20 ref, 3 append.

Descriptors: *Saline water, *Water pollution control, Rivers, *Texas, Brines, Springs, Water quality, Water chemistry, Chlorides, Sulfates, *Water supply, Potable water.
Identifiers: *Brazos River(Texas), *Salinity control.

The quantity of salts collected and transported by the Brazos River, Texas, can be substantially reduced by construction of control projects proposed by the Corps of Engineers. Construction of salinity control project will reduce mineral concentrations sufficiently to allow use of water resources in the entire stretch of the main stem in and below Possum Kingdom Reservoir for potable water supplies. (Knapp-USGS)
W74-09755

STATE STANDARDS FOR MERCURY AND HEAVY METALS.
Environment Reporter, 1973, p 41-50. State Water Laws, Sec 621: 0401-0410, 1 tab.

Descriptors: *Mercury, *Heavy metals, *Water quality standards, *Standards, Control, Regulation, Toxins, Waste water treatment.

This digest was compiled in order to provide general information to the public as well as to Federal, State and local officials. It contains excerpts from the individual Federal-State water quality standards establishing mercury and heavy metals criteria for interstate waters. Standards, the first nationwide strategy for water quality management, contain four major elements: (1) the use to be made of the interstate water, (2) criteria to protect those uses, (3) implementation and enforcement plans, and (4) an antidegradation statement to protect existing high quality waters. Mercury, silver, arsenic, cadmium, chromium, copper, lead, nickel, and zinc are heavy metals in waters which present serious pollution problems because they have persistent and toxic effects for many years following deposit. Marine organisms, especially shellfish, readily take up and concentrate these heavy metals, which are thereafter ingested by man. Individual state-adopted criteria are listed. Twenty-five states have no specific criteria. (Jernigan-Vanderbilt)
W74-09767

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

DECISION ANALYSIS ON WATER RESOURCES PLANNING AND MANAGEMENT FOR AN ARID METROPOLITAN CENTER IN WEST TEXAS,
Texas A and M Univ., College Station. Water Resources Inst.
J. H. Dean, and C. S. Shih.
Available from the National Technical Information Service as PB-233 377, $4.75 in paper copy, $1.45 in microfiche. Technical Report No. 54, October 1973. 142 p, 17 fig, 38 ref. OWRR B-102-TEX(1). 14-31-0001-3652.

Descriptors: *Risks, *Decision making, Probability, Cities, Water resource development, Evaluation, *Texas, Alternative planning, Water management(Applied), Arid lands.
Identifiers: Delphi method, *Probability assessment, *Utility assessment, Urban water resources development, *San Angelo(Tex), *Bayesian decision analysis, Sensitivity analysis.

Bayesian decision theory provides a procedure for the use of subjective data in decision-making situations related to urban water resource development. The procedure is effectual in pursuing a set of goals and transforming individual group indecisiveness into satisfactory decisions. The approach is highlighted due to its capability to incorporate seemingly unquantifiable, abstract factors into the decision-making process. It is realized that the soliciting of expert and general public opinion is indispensible in making choices for the welfare of the general public from alternative courses of action under uncertainties. The analysis presented considers engineering alternatives, quality, quantity, cost, and the intangible public response in an integrated effort for the selection of optimum strategies in urban water resource development.
W74-09364

FUNCTIONS TO PREDICT OPTIMAL IRRIGATION PROGRAMS,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 3F.
W74-09476

ANALYTICAL MODEL FOR MANAGEMENT OF ALLUVIAL AQUIFERS,
Colorado Dept. of Natural Resources, Denver. Div. of Water Resources, Planning and Investigations.
For primary bibliographic entry see Field 4B.
W74-09477

USE OF DECISION THEORY IN RESERVOIR OPERATION,
British Columbia Univ., Vancouver. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W74-09478

CONTINUOUS SIMULATION MODELS IN URBAN HYDROLOGY,
Organization Stanford Univ., Calif.
For primary bibliographic entry see Field 3D.
W74-09479

A TEST OF ALTERNATIVE MODELS FOR PROJECTING COUNTY INDUSTRIAL PRODUCTION AT THE 2, 3, AND 4-DIGIT STANDARD INDUSTRIAL CODE LEVELS,
Livingston Coll., New Brunswick, N.J.
For primary bibliographic entry see Field 3E.
W74-09551

THE EFFECTS OF WATER RESOURCES DEVELOPMENT ON ESTUARINE ENVIRONMENTS,
Texas Water Development Board, Austin. Coastal Zone Studies Branch and Systems Engineering Div.
For primary bibliographic entry see Field 2L.
W74-09556

SIMULATION CRITERIA FOR SELECTING WATER RESOURCE SYSTEM ALTERNATIVES,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
G. J. Vicens, and J. C. Schaake, Jr.
Report No 54, September 1972. 133 p, 17 fig, 11 tab, 45 ref.

Descriptors: *Systems analysis, *Decision making, *Analytical techniques, *Mathematica

models, *Planning, Benefits, River basin development, Design, Correlation analysis, Computer programs.
Identifiers: *Simulation models, Multiobjective planning, Rio Colorado(Argentina).

The application of experimental design principles to water resource simulation is examined. The research explores the role of simulation in planning, the experimental nature of simulation, criteria to make sampling decisions about the appropriate length of simulation experiments, and a basis to evaluate decisions based on simulation experiments. The role of simulation in planning is described. The concept of designing simulation experiments and an application of the techniques developed as applied to Rio Colorado, Argentina, are explored. Of the two procedures described, the first allows pair-wise comparisons of the alternatives. The effects of serial and cross-correlation samples are explored the former increasing the required number of observations while the latter reduces the length of required runs. The second procedure allows comparison of more than two alternatives but does not consider correlated samples. Utilizing the above procedures, the experimentor can assess the reliability of information which he provides. For any set of weights on the objective the reliability of selecting any alternative as optimal can be evaluated. Additionally, the number of additional observations required to improve reliability can be specified. A computer program and a user manual for the Rio Colorado study are given. (Schroeder-Wisconsin)
W74-09567

A GENERAL PURPOSE SIMULATION MODEL FOR ANALYSIS OF SURFACE WATER ALLOCATION USING LARGE TIME INCREMENTS,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
E. A. McBean, R. L. Lenton, G. J. Vicens, and J. C. Schaake, Jr.
Report No 160, November 1972. 245 p, 16 fig, 4 tab, 12 ref.

Descriptors: *Rivers, *Mathematical models, *Decision making, *Comprehensive planning, *Water allocation(Policy), Scheduling, River basin development, Algorithms, Computer programs, Analytical techniques.
Identifiers: Multiple objective planning, *Argentina(Rio Colorado).

The computer program, HISIM (High-spped Simulation) is designed to provide a versatile approach to river basin planning through the tracing of the real time behavior of a river system when affected by a variety of external conditions. The discrete time intervals utilized are of the order of several months. This report is essentially a user's manual for the simulation model, providing the formulation of the various algorithms, definition of the model's structure, and description of the input data requirements. In order to provide the model with flexibility, the river system is pictured as a series of nodes connected between appropriate points by reaches or arcs. Nodes identified include dam points, diversion points, junction points, and irrigation points. Related to each of the nodes is one or more algorithm which specifies how the component works. The general form of the mathematical program associated with HISIM maximizes the sum of the net weighted regional and national benefits. To evaluate the objective functions, HISIM contains two accounting schemes to assess national and regional benefits. An application of HISIM to the Rio Colorado, Argentina is documented and discussed. (Schroeder-Wisconsin)
W74-09568

COMPUTER MODELING APPLICATIONS IN URBAN WATER PLANNING,
Denver Board of Water Commissioners, Colo.
N. Hobbs, and J. D. Britton.
Available from the National Technical Information Service as PB-233 673, $3.25 in paper copy, $1.45 in microfiche. American Society of Civil Engineers, Urban Water Resources Research Program Technical Memorandum No 22, New York, N.Y., March, 1974, 31 p, 2 tab, 11 fig, 3 ref. OWRR C-4048(No 9009)(5).

Descriptors: *Water supply, *Computer models, *Project planning, *Cities, Urbanization, *Reservoir storage, Diversion structures, Water conveyance, *Cost analysis, *Systems analysis, Hydrologic budget, Aquifer characteristics, Conjunctive use, Automatic control, Water reuse, Snowmelt, Prior appropriation, Water rights, Water transfer, *Colorado.
Identifiers: *Denver Water Department(Colo), Metropolitan studies, Modeling costs, Water distribution systems.

Few cases have been publicly documented where systems analysis techniques have been used in planning urban water supply systems. Indicated are applications made by a leading agency. Almost two-thirds of its metropolitan population is served by the Denver Water Department from a complex raw-water collection system that extends almost 150-miles to capture mountain snowmelt and involves transfers through the Continental Divide. Not detailed are plans for large-scale reuse and automatic control. Raw-water facilities-planning applications are emphasized. Descriptions, development histories, applications and costs incurred are presented for seven models: a collection system; a river-aquifer system; daily flow-routing; revenue-expenditure projection; a large-scale river basin; stream quality-quantity; and pumping power-requirements for a collection system. Some of the models could be used readily elsewhere. Computer requirements and model documentation status are described. Future raw-water facilities planning computer applications will include: runoff simulation and forecasting; a wastewater accounting system for reuse; a data-system development; urban growth pattern projection; and environmental analysis. Ultimately, raw and treated water simulation tools will be comprehensively integrated under a total system concept. (McPherson-ASCE)
W74-09654

MINIMIZING WATER AND SEWER SYSTEM COSTS USING TOPAZ,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Urban and Regional Studies.
J. W. Dickey, J. M. Anthony, D. R. Burton, A. R. Gordon, and K. R. Morgan.
Available from the National Technical Information Service as PB-233 690, $5.50 in paper copy, $1.45 in microfiche. Virginia Water Resources Research Center, Blacksburg, Bulletin 67, March 1974. 194 p, 16 tab, 20 fig. OWRR A-050-VA(1).

Descriptors: *Land use, *Costs, Sewage, *Zoning, Water supply, *Virginia, *Optimization, Optimum development plans.
Identifiers: TOPAZ, Water system links, Sewage service, Cost Criterion, Blacksburg(Va.), Cost minimization, Cost models.

A mathematical technique known as TOPAZ (Technique for the Optimal Placement of Activities in Zones) has been applied to the Blacksburg, Virginia area, for which some data were already available, and an example was developed. Cost models for water and sewage service facilities were developed and employed in conjunction with other cost models (e.g., for travel, roads, and streets, buildings, and land values) to determine the least cost land use arrangement patterns. Additional studies were made of (1) proper criteria for use in TOPAZ, and (2) organization, legal, and financial mechanisms for implementing TOPAZ results. Findings indicate that (1) the minimum cost criterion appears most appropriate, (2) cost models are a definite need in TOPAZ, (3) resulting land use allocations are close to existing development, and (4) implementation mechanisms are very weak.
W74-09658

6B. Evaluation Process

COMMUNICATIONS FOR URBAN WATER RESOURCES MANAGEMENT--A REVIEW AND ANNOTATED BIBLIOGRAPHY,
Gates (W. E.) and Associates, Inc., Fairfax, Va.
T. J. Cooke, and R. M. Males.
Available from the National Technical Information Service as PB-233 332, $4.00 in paper copy, $1.45 in microfiche. Completion Report, February 1974. 89 p, 1 fig, 122 ref. OWRR C-3196(no. 3700)(1).

Descriptors: *Water management(Applied), *Social participation, Behavior, *Bibliographies, Human resources, Reviews, Decision making, Cities, *Communication.
Identifiers: *Mass media, *Public involvement, *Citizen participation, Public relations, Small group techniques.

A literature review of the broadest aspects of 'communications theory' and practice is presented. The review is intended as a source-book for professionals interested in utilizing the findings of communications research in the design and conduct of public involvement programs for urban water resources programs. A basic presentation of the fundamental findings of communications theory, in the areas of basic communications processes, mass communications/persuasion, small group processes, and face to face communications is included. Literature surveyed is organized into theoretical, methodological, and applications areas, including sources for design of opinion sampling procedures, small group discussions, public hearings, etc. For most references included, pertinent quotes and citations are given to show the character and main thrust of the source document. (See also W74-09252)
W74-09251

DESIGN OF PROTOTYPE MASS MEDIA PROGRAMS FOR TESTING IN THE LOWER JAMES RIVER BASIN,
Gates (W. E.) and Associates, Inc., Fairfax, Va.
R. M. Males.
Available from the National Technical Information Service as PB-233 433, $3.25 in paper copy, $1.45 in microfiche. Completion Report, February 1974. 25 p, 2 fig, 2 ref. OWRR C-31196(no. 3700)(2).

Descriptors: *Water management(Applied), Water quality, *Social participation, Behavior, *Virginia, Human resources, Decision making, *Communication.
Identifiers: *Mass media, *James River basin(Va.), Public involvement, Citizen participation, Public relations, Small group techniques.

Based upon a field survey, interviews, and literature review, the mass media program design for the public involvement and education aspects of a major water quality planning effort encompassing the Richmond and Norfolk areas of Virginia is presented. The design is considered to be a prototype design, which, with adaptation, can be useful in many areas and types of public involvement programs. A description of the philosophy and techniques of true public involvement is included, and the major features of the various types of mass media, and their utility in such programs, is discussed. Media included in the discussion/design are: presentations to small groups; 'sunday supplements;' TV documentary series; ongoing news coverage; public information booklet; public hearings; radio/TV talk shows; high school, college, and local news coverage; in school TV programming. The overall program design is charac-

terized in terms of goals, strategy, targets, media, timing, and organizational format. (See also W74-09251)
W74-09252

WASTE MANAGEMENT: GENERATION AND DISPOSAL OF SOLID, LIQUID AND GASEOUS WASTES IN THE NEW YORK REGION,
Regional Plan Association, N.Y.
For primary bibliographic entry see Field 5G.
W74-09353

ENVIRONMENTAL CONSIDERATIONS FOR WATER MANAGEMENT DISTRICT 6 OF COLLIER COUNTY,
Collier County Conservancy, Inc., Naples, Fla.
E. T. LaRoe.
Available from the National Technical Information Service as PB-233 483, $3.75 in paper copy, $1.45 in microfiche. Rookery Bay Land Use Studies, Study No. 8, Published by the Conservation Foundation, Washington, D.C., January 1974. 30 p, 7 fig, 15 ref. OWRR C-4022(No 9004)(4) C-1817(No 3170)(4) and C-2201(No 3385)(4).

Descriptors: *Florida, *Land use, *Optimum development plans, Coasts, Gulf of Mexico, Water utilization, Estuaries, *Water management(Applied), Planning, Water resources development, Natural resources, Conservation.
Identifiers: *Naples(Fla), *Rookery Bay(Fla).

A land and water use management program, designed to be consistent with and to complement existing state and local planning efforts, is proposed for a 64 square-mile coastal watershed around Rookery Bay Sanctuary near Naples, Florida. The program is intended to permit optimum development consistent with the protection and conservation of the natural resources. Existing values, resources and benefits of the natural system; physical restraints on potential development; and existing state and Federal wetlands guidelines are documented and considered. The program recommends a system of classifying lands as preservation, conservation (limited development) and development areas, based on natural features, resources, and constraints. Specific recommendations for developmental practices, as well as guidelines for implementation of the program, are included, as is a large-scale vegetation map suitable for use by planners.
W74-09360

DECISION ANALYSIS ON WATER RESOURCES PLANNING AND MANAGEMENT FOR AN ARID METROPOLITAN CENTER IN WEST TEXAS,
Texas A and M Univ., College Station. Water Resources Inst.
For primary bibliographic entry see Field 6A.
W74-09364

WATER SUPPLY EVALUATION AND PROPOSED COMPREHENSIVE STUDY OF THE CHARLESTON-BUSHY PARK INDUSTRIAL COMPLEX, SOUTH CAROLINA,
Geological Survey, Columbia, S.C.
For primary bibliographic entry see Field 2L.
W74-09389

CANOEIST SUGGESTIONS FOR STREAM MANAGEMENT IN THE MANISTEE NATIONAL FOREST OF MICHIGAN,
Huron-Manistee National Forest, Cadillac, Mich.
M. J. Solomon, and E. A. Hansen.
Research Paper NC-77, 1972. 10 p, 4 fig, 2 tab, 3 ref.

Descriptors: *Boating, *Rivers, *Michigan, *Recreation, *Aesthetics facilities, *Attitudes, Erosion, Dams, Erosion control, Chennel improvement, Use rates.
Identifiers: *Manistee National Forest(Mich).

A survey was undertaken to determine canoeists' opinions concerning their experiences on the Pine River, Michigan. Canoeists' attitudes toward eroding streambanks should play a large role in deciding whether or not to stabilize the banks. About 50,000 persons canoed the Pine River during 1971. Most canoeists enjoyed their trip, particularly the rapids and the wild, natural appearance of the stream and its shoreline. The primary objections concerned littering and crowding. Comments that involve stream management can be summarized as 'leave the stream natural with little or no development' and 'clean up the litter.' Canoeists were unconcerned about eroding streambanks and about a dam they had to portage around. (Knapp-USGS)
W74-09404

ENVIRONMENT: A NEW FOCUS FOR LAND-USE PLANNING.
National Science Foundation, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-09412

ECONOMIC POLICIES, ENVIRONMENTAL PROBLEMS, AND LAND USE,
California Univ., Riverside.
R. C. d'Arge.
In: Environment: A New Focus for Land Use Planning, National Science Foundation, Washington, D.C., Report NSF/RA/E-74-001, p 157-182, October, 1973. 2 fig, 30 ref.

Descriptors: *Economics, *Economic efficiency, *Land use, *Environmental control, *Decision making, Use rates, Social values, Evaluation, Local governments, State governments, Equitable apportionment, Texas, Administration, Planning.
Identifiers: Control agency structure, Information costs.

A wide range of developments in economic theory present a number of options in the resolution of land use problems. These developments are in areas such as information costs, improvements on the Pareto efficiency concept, charge and subsidy systems, coercive exchange processes, irreversibility, and input-output systems. In order to employ these theoretical tools, a toxonomic division is made of the environmental/land use problem into 3 areas: (1) actors and action systems, (2) social indicators and evaluative system and (3) goals and the social welfare system. Using these divisions a need is seen for a prespecified set of goals and weights, a location and time specific set of social indicators, measurements of changes in social constraints, and a complete analysis of the relative efficiency of different environmental planning systems. In developing a control strategy, the degree of directness must be carefully chosen. A direct strategy such as zoning allows little or no latitude for private decision making and has high enforcement costs. A more indirect approach, e.g. user charges, has high information costs and more linkages between cause and effect. An optimum of directness (in terms of cost) exists somewhere between the two extremes. Criteria should be developed to compare the effectiveness of different control agencies, employing differing strategies. Such criteria should include efficiency in terms of cost, reliability of resolving issues, speed of operation, information costs, flexibility and degree of public understanding. (See also W74-09412) (LaPointe-North Carolina)
W74-09417

ECOLOGICAL CONCEPTS AND APPLICATIONS TO PLANNING,
Michigan State Univ., East Lansing. Dept. of Zoology.
W. E. Cooper, and R. D. Vlasin.
In: Environment: A New Focus for Land Use Planning, National Science Foundation, Washington, D.C., Report NSF/RA/E-74-001, p 183-215, October, 1973. 6 fig, 3 ref.

Descriptors: *Ecology, *Environment, *Ecosystem, *Planning, Constraints, Economic efficiency, Stability, Succession, Economies of scale, Waste treatment, Energy, Energy transfer, Institutions, Mass transfer, *Waste assimilative capacity.
Identifiers: Ecological irreversibility.

Certain ecological relationships can provide fundamental inputs to the planning process. Materials flow, waste matter and energy, waste assimilation and assimilation rates, production of a stable ecosystem, man's relationship to the natural ecological components of the earth's surface are some examples. In order to conceptualize the real world system it must be abstracted into a limited number of functional components: (1) transformations of matter and energy; (2) transport and storage of matter and energy; and (3) the control processes of feedback and selection. Any such conceptualization, however, requires an understanding of fundamental differences in two subsystems: human and natural. These subsystems vary in goals (growth versus survival), time domains (25 years versus many generations), spatial dimensions (highly aggregated versus highly dispersed) and stability. Other technical concepts suggested as direct use to planners are: (1) successional states, especially in computing the costs associated with maintenance of a simplified landscape; (2) natural constraints, to determine true productive and assimilative capacity of an ecosystem; and (3) processing capabilities, to prevent overloading. Determination of ecological potentials, waste treatment, the use of economies of scale, and the production of energy are all areas or practical application of ecological concepts. Particular emphasis should be placed on minimizing decisions that may result in irreversible environmental changes such as extinction, introduction of nondegradable chemicals, and depletion of concentrated resources. A serious difficulty exists in the marked dissimilarity between ecological space and policy space. (See als W74-09412) (LaPointe-North Carolina)
W74-09418

PLANNING FOR AREAS OF SIGNIFICANT ENVIRONMENTAL AND AMENITY VALUE,
California Univ., Berkeley. Dept. of Landscape Architecture.
R. H. Twiss.
In: Environment: A New Focus for Land Use Planning, National Science Foundation, Washington, D.C., Report NSF/RA/E-74-001, p 233-247, October 1973. 44 ref.

Descriptors: *Research priorities, *Planning, *Land use, *Land development, *Land management, Value, Regional development, Environmental effects, Economies of scale, Coordination, Estuaries, Urbanization, Legal review.
Identifiers: *Environmental impact statements, Amenity value, Functional planning, Research strategies.

The beneficial effects of critical areas radiating over large distances and advanced techniques in research, planning and implementation that have been developed in managing these areas are illustrative of their broader planning significance. A wide range of physical characteristics are of environmental signfificance, for example, physiographic features such as deep water access; key commodity resources; key renewable resources, e.g. a wildlife habitat or forest resources; natural processes, e.g. groundwater recharge areas; natural hazards like floodplains or geologic instability and high pollution absorption levels. Site planning, regional planning and functional planning would all be concerned at some time with areas of significant environmental value although they would have varying objectives, options and information needs. Functional planning (i.e. planning for a specific use), has particular tools at its disposal such as legislative review, administrative budget review, internal agency review and coordination

team planning, and functional area planning. The Environmental Impact Statement, a tool of special importance, can be critical to sensitive-area management as in the case of the Trans-Alaskan pipeline; however, impacts must be expanded to include the ecological chain of events that will follow given developments. General areas for proposed research are: key decision points in terms of jurisdiction and scale (i.e. global, national, state, local); increasing the efficiency of planning procedures and tasks already in common use; topics of practical value; and the economic costs of environmental policies and plans, plus matching research in specialized academic disciplines. (See also W74-09412) (LaPointe-North Carolina)
W74-09420

MANAGING WATER RESOURCES FROM THE WRONG PLACE AT THE WRONG TIME,
California State Dept. of Water Resources, Sacramento. Div. of Resources Development.
C. A. McCullough.
Journal American Water Works Association, Vol 66, No 3, p 187-192, March 1974. 6 fig, 1 ref.

Descriptors: *Water management(Applied), *Water distribution(Applied), Groundwater management, Water demand, Watershed management, *Water supply development, *Planning, *Reservoir storage, Flood control, Desalination, Water quality control, *California.
Identifiers: California State Water Project, California Aqueduct.

California's economy is developed through use of summer flows of streams and drilling of wells in extensive groundwater basins. As these sources were overexploited, storage of winter flood flows and massive transportation facilities were constructed. Extensive water-quality control programs were implemented. The California State Water Project is described. New dimensions in water resource development are presented including desalting water, reclaiming and reusing water, weather modification, watershed management, and exploring the possibility of developing usable water from geothermal sources. Storage of water near urban areas is emphasized. (Campbell-NWWA)
W74-09528

BEYOND 'CITY WATER': RURAL WATER SYSTEM DESIGN,
Conset, Inc., Washington, D.C. National Demonstration Water Project.
L. E. Foster.
Water Well Journal, Vol 28, No 2, p 26, 53-55, February 1974.

Descriptors: *Wells, Community development, Water supply, *Design, Rural areas, Economics, Flow rates, Conduits, Construction costs, Operating costs.
Identifiers: *Rural water supply.

The factors to be considered in the development of an economical, safe, and dependable rural water supply are discussed. In designing rural water facilities it is suggested that greater emphasis be placed on such factors as simplicity, flexibility, low initial construction cost, ease of operation, ease of maintenance, and low cost of operation. The point is made that the design of rural water systems should not follow the plans of the more elaborate and sophisticated urban facilities. (Campbell-NWWA)
W74-09538

ACCELERATED GROWTH IN AGRICULTURAL PRODUCTION AND THE INTERSECTORAL TRANSFER OF RESOURCES,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 3F.
W74-09550

CHURCHILL FALLS--THE COSTS AND BENEFITS OF A HYDRO-ELECTRIC DEVELOPMENT PROJECT,
Macquarie Univ., North Ryde (Australia).
P. Crabb.
Geography, Vol 58, No 261, Part 4, p 330-335, 1973. 2 fig.

Descriptors: *Hydroelectric plants, *Cost-benefit analysis, *Project post-evaluation, Subarctic, Environmental effects, Economic impact, Underground powerplants, *Canada, Hydroelectric power, Reservoirs.
Identifiers: *Labrador(Canada), Churchill Falls(Labrador).

In June 1972 the Churchill Falls hydroelectric project was operationalized, five months ahead of schedule. The $1073 million, 5225 mW project is located within the southern Labrador wilderness and is the largest single H.E.P. station in the Western World. The main storage body, Smallwood Reservoir, was formed by 64 km of earth and rock-fill dykes and represents the third largest man-made lake in the world. Water levels are regulated by seven remote control structures with heated gate-guides to prevent ice formation. The construction of the vast project in such a remote location created problems of transmission which had to be overcome. The Churchill Falls scheme provides significant power to Quebec as well as to Ontario, New Brunswick, Maine, and New York State. The project has not boosted the development of Newfoundland and Labrador, apart from one short term construction income. Additionally the project made major ecological changes to the Lower Churchill River and southern Labrador which have not fully been assessed. (Schroeder-Wisconsin)
W74-09562

ENVIRONMENTAL DISRUPTION: IMPLICATIONS FOR ECONOMIC PLANNING,
U. E. Simonis.
Developing Economies, Vol 10, No 1, p 86-105, 1972. 41 ref.

Descriptors: *Gross National Product, *Welfare(Economics), *Planning, *Environmental effects, Regional economics, Social values, Decision making, Community development.
Identifiers: *Gross National Welfare Index.

Improved environmental planning and changing concepts of regional and national development have led to increasing demands for a revision of the GNP accounting process. A review of the existing practices reveals rising GNP with declines in welfare, a worsening infrastructure, increased agglomeration of population and industry, and greater risk of environmental disruption. A number of alternatives to GNP accounting practices which alleviate these problems are reviewed. In the first, 'net national welfare,' both 'bads' and 'goods' are calculated to allow the integration of environmental factors into economic and political decisions. 'Bads' discussed include institutionalization of wastes, depletion of resources, and inefficiency of the dynamic adjustment processes. Other alternative accounting methods proposed examine declines in stock variables rather than the flow-variables approach in traditional GNP practices and a measure which evaluates changes in levels of qualitative social indicators representing scales of obtainment of basic social needs. Included in the former variables are natural stock--water; public stock--housing and transportation; and personal stock--teachers and doctors. Social indicators face an essential difficulty in determining weights for aggregation. Unlike GNP, each of the alternative accounting approaches does not emphasize growth concentrating on the improvement of welfare instead. (Schroeder-Wisconsin)
W74-09564

GROUNDWATER QUALITY. DOOR COUNTY, WISCONSIN.
Wisconsin Univ., Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 5B.
W74-09565

SIMULATION CRITERIA FOR SELECTING WATER RESOURCE SYSTEM ALTERNATIVES,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 6A.
W74-09567

A GENERAL PURPOSE SIMULATION MODEL FOR ANALYSIS OF SURFACE WATER ALLOCATION USING LARGE TIME INCREMENTS,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 6A.
W74-09568

ECONOMIC DEVELOPMENT STUDY OF THE TEXAS COASTAL ZONE,
Texas A and M Univ., College Station. Industrial Economics Research Div.
G. R. Rapp, D. M. French, and J. Miloy.
Available from the National Technical Information Service as COM-73-1041, $3.00 in paper copy, $1.45 in microfiche. Sea Grant Program TAMU-SG-72-212, June 1972. 140 p, 24 fig, 29 tab, 29 ref. NOAA 2-35213.

Descriptors: *Economic prediction, *Baseline studies, *Texas, *Coastal plains, Economics, Human population, Natural resources, Industries, Employment, Income, Rural areas, Urbanization, Land use, Recreation, Tourism, Navigation, Water resources, Regional development, Forecasting.
Identifiers: *Texas coastal zone, Deepwater ports, Supertankers, Nuplex.

Baseline data for the years 1940-1970 on economics, natural resources and demographics is compiled and analyzed, and future assumptions and economic projections generated to the year 2020. In the examination of economic growth are population growth, industrial growth by sector, employment trends and income trends for the Texas Coastal Zone. Current conditions of renewable and nonrenewable resources are explored. In the first category, agricultural and commercial fishing resources are discussed; for the latter, existing quantities, quantities consumed, and resource valuation are presented for mineral fuels, cement, stone, sulphur, salt, sand and gravel. lime, clay and gypsum. Urban and rural changes are delineated and demographic trends, income trends, industrial earnings by sector, and land use are examined primarily for the 1940-70 period. Further assumptions are explored and projections made for future population, industries, income, recreation and tourism, and employment levels within the zone. The ratio correlation method, the standard linear regression model assuming constant slope, and least squares were used to project population, production and economic values, and employment, respectively. The feasibility of a Nuplex, a large agglomeration of agricultural and industrial facilities combined with the necessary supporting population and producing and fabricating products, to be located in this area is described. (Schroeder-Wisconsin)
W74-09569

SNOW LOAD ANALYSIS AND RECREATIONAL USES OF SNOW DATA,
For primary bibliographic entry see Field 2C.
W74-09610

ASSESSING VISUAL-CULTURAL VALUES OF INLAND WETLANDS IN MASSACHUSETTS,
Massachusetts Univ., Amherst. Dept. of Landscape Architecture.
R. C. Smardon.
Available from the National Technical Information Service as PB-233 687, $18.50 in paper copy, $1.45 in microfiche. Thesis, October 1972. 308 p, 2 fig, 35 tab, 32 plates, 6 append, 297 ref. OWRR B-012-MASS(2), OWRR B-023-MASS(2).

Descriptors: *Wetlands, *Aesthetics, *Social values, *Evaluation, *Decision making, *Massachusetts, Land use, Classification, Legislation, Value engineering, Cost-benefit analysis, Model studies.
Identifiers: Inland wetlands.

The incorporation of the visual-cultural values of inland wetlands into governmental land-use decisions is explored for Massachusetts. Previous studies which have sought to identify, analyze, and classify workable inland wetland types and surrounding landscape types are reviewed and a general form is suggested for Massachusetts wetlands. Visual-cultural values include the visual, recreational, and educational values of the wetlands to society. An inland wetland decision model, utilizing previously collected data, is developed to determine priorities for wetland preservation. The model is eliminative, in that it eliminates a wetland from development if it receives top priority in any of three evaluation levels. At level 1, are wetlands identified as outstanding natural areas, having high regional value or playing an important part in the overall wetland system which are rated top priority. If not eliminated at this stage, the wetland is next rated and ranked by its physical dimension and characteristics, utilizing 10 natural resource variables. A composite score composed of a weighted sum of the ten variables is developed to rank each wetland. The third level of evaluation considers the cultural values, i.e., accessibility, location near schools, etc., of the wetlands. The versatility of this approach to many decision levels is discussed. (Schroeder-Wisconsin)
W74-09651

WATER RESOURCES PROBLEMS AND RESEARCH NEEDS IN MINNESOTA, 1974 - GUIDELINES FOR RESEARCH PROGRAMS,
Minnesota Univ., St. Paul. Water Resources Research Center.
W. C. Walton.
Available from the National Technical Information Service as PB-233 689, $4.75 in paper copy, $1.45 in microfiche. Bulletin 68, June 1974. 127 p, 26 ref. OWRR A-028-MINN(10).

Descriptors: *Water resources, *Planning, *Minnesota, *Research priorities, Research and development, *Conferences, Water resources, Institute, State governments, Government finance.
Identifiers: *Research needs.

Eight water resources problem-research need analysis conferences were held during 1973 to determine research needs and to set research need priorities. A committee reviewed institutional arrangements for coordinating water resources research efforts in Minnesota and recommended that the Water Resources Research Center expand its Advisory Committee to include additional members from State Colleges and Branches of the University of Minnesota. A statewide priority list of 230 needed research projects was generated and research costs ($9 million) and manpower (500 man-years) needs were estimated. According to future projections based on past trends, total expenditures for water resources research conducted in Minnesota could increase from about $3.9 million in 1972 to about $8 million in the year 2020. Projections of expenditures, can only be classified as modest. About 67 percent of water resources research proposals submitted by faculty of the University of Minnesota and State and Private Colleges in 1972 was funded. There is a need for about $700,000 of additional annual financial support. This need could be met within a reasonable period of time if Congress were to appropriate and the President were to release additional funds consistent with its full authorizations associated with the amended Federal Water Resources Research Act and the Federal Water Pollution Control Act amendments of 1972, and the State Legislature, through the Minnesota Resources Commission, were to increase its annual financial support for water resources research by at least $100,000.
W74-09656

WATER RESOURCE PROBLEMS AND RESEARCH NEEDS OF NORTH CAROLINA - A REASSESSMENT,
North Carolina Water Resources Research Inst., Raleigh.
D. H. Howells.
Available from the National Technical Information Service as PB-233 699, $4.00 in paper copy, $1.45 in microfiche. Report No 2 (Revised), June 1, 1974, 70 p, 35 ref. OWRR A-999-NC(40). 14-31-0001-4033.

Descriptors: *North Carolina, *Research priorities, *Planning, *Research and Development, *Management, Water pollution control, Land use, State governments, Legislation.

A summary is presented of North Carolina's water resource problems and research needs, prepared as a source of orientation for the NC Water Resources Research Institute's research program. The subject matter is presented within the broad categories of water resource planning, water pollution control, and water quantity management. The problems and needs discussed represent those areas in which the Institute is attempting to encourage a research response from potential investigators. Current and needed studies and research referred to reflect the collective statewide effort of public agencies, industry, and the university community. Twenty-three priority research needs are separately listed. Three appendices are devoted to 'Declaration of Public Policy and Goals for Water Related Land Resources,' 'New State Legislation and Utility Commission Rules,' and 'Basic Data Systems'. (McJunkin-North Carolina State)
W74-09657

ALTERNATIVE SOLUTIONS TO WATER RESOURCE DEVELOPMENT--A CASE STUDY,
Texas A and M Univ., College Staztion. Water Resources Inst.
R. David Basco, and K. M. A. Rahman.
Available from the National Technical Information Service as PB-233 725, $5.50 in paper copy, $1.45 in microfiche. Office of Water Resources Research Technical Report No 55, May 1974. 175 p, 31 fig, 35 tab, 100 ref, 8 append. OWRR B-141-TEX(1). 14-31-0001-3938.

Descriptors: Planning, *Alternative planning, Comprehensive planning, *Project planning, *Texas, Alternative water use, *Water resources development, Feasibility studies, *Methodology, *Cost comparisons, Multiple purpose projects, Reservoirs.
Identifiers: *Brazos River basin(Tex), *Millican reservoir(Tex).

An effort was made to develop procedural methodology for the consideration of alternative solutions for water resources development in a short period of time with a view toward reduction of total costs involved in prefeasibility studies. Three techniques were developed to estimate the investment costs of a reservoir project, a levee project, and a basin conservation reservoir project in an economic region. The application of the methodologies were illustrated by a case study. The cost of a reservoir project in the case study area determined by the method developed was in excellent agreement with the Corps of Engineers' estimate using conventional methods. Selected solutions for water resources development problems in the Navasota River watershed were analyzed. The cost of water supply by desalination in the service area of the proposed Millican reservoir was computed following the procedure recommended by the Office of Saline Water. The investment costs of the alternatives were compared. The multipurpose reservoir project for flood control, water supply and recreation was found to be the least costly project. However, levees for flood protection in the lower Brazos River basin and desalting for water supply appeared to possess more intangible environmental benefits although the estimated cost of this multipurpose alternative was somewhat higher in comparison to the multipurpose reservoir project. Evaluation of intangible cost factors (environmental, aesthetic, etc.) was not possible in want of scientifically amenable procedures. Total costs (combined tangible and intangible factors) of all alternative plans could not be estimated.
W74-09661

WASTEWATER RECLAMATION: SOCIO-ECONOMICS, TECHNOLOGY, AND PUBLIC ACCEPTANCE.
Ralph Stone and Company, Inc., Los Angeles, California.
For primary bibliographic entry see Field 5D.
W74-09662

MANAGING WATER RESOURCES: BASIC CONSIDERATIONS AND PROBLEMS,
San Francisco Water Dept., Calif.
H. C. Medbery.
Journal of the American Water Works Association, Vol 66, No 3, p 173-175, March, 1974. 8 ref.

Descriptors: *Water management(Applied), *Administration, Water resources, *Water resources development, Public rights, Management, *United States.

The United States has ample water resources for present and near-future needs provided there is proper management. A standard plan for all water resources management cannot be provided since each area has specific problems. Thus the selection of a new or additional water source is dependent upon local conditions and public involvement. Growth patterns, local requirements, and special-interest groups will need balancing and adjusting if proper management is to be attained. (Sandoski-FIRL)
W74-09734

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

HURRICANE AGNES-DAMAGE IN PENNSYLVANIA,
Pennsylvania State Dept. of Transportation, Harrisburg.
For primary bibliographic entry see Field 2E.
W74-09393

FLOOD DAMAGE IN SOUTH DAKOTA,
South Dakota State Dept. of Highways, Pierre.
For primary bibliographic entry see Field 2E.
W74-09394

ECONOMICS OF ALTERNATIVE WASTE WATER TREATMENT SYSTEMS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-09427

RIGATION COST FOR LAND DISPOSAL,
orth Carolina State Univ., Raleigh. Dept. of ological and Agricultural Engineering.
or primary bibliographic entry see Field 5D.
74-09428

OSTS AND RETURNS OF LAND SPREADING ASTWATER,
orth Carolina State Univ., Raleigh. Dept. of conomics.
or primary bibliographic entry see Field 5D.
74-09429

OMPUTER DATA FLOWS SMOOTHLY FOR IALL WATER AUTHORITY,
onroeville Water Authority, Pa.
H. Kingsley.
blic Works, Vol 105, No 1, p 52-53, January, 74.

scriptors: *Treatment facilities, *Computer ograms, *Data processing, *Budgeting, nning, Consumptive use, *Pennsylvania, Mu-ipal wastes.
ntifiers: Billing, *Monroeville(Penn).

e computerized data processing procedures at Monroeville, Pennsylvania, Water Authority nt are described. The plant has 7,548 customers o use an average of 2.7 million gallons water a . An IBM System/3 Model 6 computer cesses all water billing accounting work includ- payroll and general ledger, as well as arranging nagement reports. The computer provides vital ter consumption analyses for rate structure pur-es and allows billing on a monthly, quarterly, egular budget basis. Other services and reports lude: trial balance reports giving a complete tus of the business within one hour; water bills cessed at the rate of eight per minute; sheets the reader's meter book processed at the rate 40 a minute; an alphabetic listing of customers wo and a half hours; a tenant listing in rental perties; and a monthly past-due listing. erritt-FIRL)
4-09483

ONEERING PLANT PROVIDES COST-SAV-; ALTERNATIVE TO SEPARATING WERS.
primary bibliographic entry see Field 5D.
4-09490

STORATION OF WASTEWATER FACILI-S DAMAGED BY TROPICAL STORM NES,
vironmental Protection Agency, Washington, . Emergency Operations and Planning Div.
primary bibliographic entry see Field 5D.
4-09496

ONOMIC IMPACT OF FWPCA WATER EF-ENT STANDARDS AND GOALS.
primary bibliographic entry see Field 5D.
-09497

ND M COSTS: PAY NOW OR PAY LATER,
ional Water Well Association, Houston, Tex.
earch Facility.
primary bibliographic entry see Field 4B.
-09533

PLY-ECONOMIC RELATIONSHIPS OF SHORE PETROLEUM OPERATIONS,
onal Petroleum Council, Washington, D.C.
primary bibliographic entry see Field 3E.
-09552

ECT OF WATER METERING IN USA.
er and Water Engineering, Vol 77, No 932, p 380, 1973.

Descriptors: *Water utilization, *Measurement, *Pricing, *Instrumentation, Lawns, Domestic water, Industries, Elasticity of demand, Water rates, Use rates, United States.
Identifiers: *United Kingdom.

Long term water usage trends and the impact of metering on United States' consumption were surveyed in a Water Use Committee report, an American Water Works Association study group; the report's implications for the United Kingdom water use trends are discussed. While U.S. residential per customer usage increased by 1% in 1960-70, actual per capita increase may be less, the per customer increase reflecting an increased number of multifamily units found on a single account. Population movements, changes in housing styles, increased industrial water use efficiency, and greater customer cost consciousness have affected long term water usage trends. Several examples of higher costs illustrate the impact of water metering on consumption. In one study of 23 undertakings, an increase to 60-70 cents from 20-30 cents per 1000 U.S. gallons decreased consumption 30%. Overall consumption decisions following prices increase, it is contended, depend upon the level of water usage and the severity of the increase, with consumption declines often only temporary. A comparison of U.S. and U.K. rates and usage indicates that the introduction of metering and resultant higher prices will have little impact on the U.K. consumption until sizeable per capita consumption increases. (Schroeder-Wisconsin)
W74-09553

CAPITAL BUDGETING FOR POLLUTION CONTROL,
For primary bibliographic entry see Field 5G.
W74-09558

EFFLUENT CHARGES: A CRITIQUE,
Pennsylvania Univ., Philadelphia. Wharton School.
For primary bibliographic entry see Field 5G.
W74-09560

CONTROLLING POLLUTION BY PRICE AND STANDARD SYSTEMS: A GENERAL EQUILIBRIUM ANALYSIS,
Williams Coll., Williamstown, Mass.
For primary bibliographic entry see Field 5G.
W74-09561

POLLUTION CONTROL: NEW METHOD OF FINANCING,
Rothschild (L.F.) and Co., N.Y.
For primary bibliographic entry see Field 5G.
W74-09563

MINIMIZING WATER AND SEWER SYSTEM COSTS USING TOPAZ,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 6A.
W74-09658

ECONOMIC IMPACT OF AGRICULTURAL POLLUTION CONTROL PROGRAMS,
Federal Reserve Bank of Kansas City, Mo.
For primary bibliographic entry see Field 5G.
W74-09665

COST OF ACHIEVING E.P.A.'S BPCTCA AND ZERO DISCHARGE.
For primary bibliographic entry see Field 5G.
W74-09748

6D. Water Demand

A TEST OF ALTERNATIVE MODELS FOR PROJECTING COUNTY INDUSTRIAL PRODUCTION AT THE 2, 3, AND 4-DIGIT STANDARD INDUSTRIAL CODE LEVELS,
Livingston Coll., New Brunswick, N.J.
For primary bibliographic entry see Field 3E.
W74-09551

THE INFLUENCE OF DRAW-DOWN ON RECREATION ON THE TRENT CANAL RESERVOIR-LAKES,
Toronto Univ. (Ontario). Faculty of Forestry.
For primary bibliographic entry see Field 4A.
W74-09555

HYDRAULICS OF A WATER SUPPLY SYSTEM WITH FLUCTUATING WATER DEMAND, (HYDRAULIK EINES WASSERVERSORGUNGSSYSTEMS MIT FLUKTUIERENDEN BEDARFSMENGEN),
Karlsruhe Univ. (West Germany). Institut fuer Siedlungswasserwirtschaft.
For primary bibliographic entry see Field 8B.
W74-09726

6E. Water Law and Institutions

REPORT ON GREAT LAKES WATER QUALITY FOR 1972.
International Joint Commission-United States and Canada.
For primary bibliographic entry see Field 5G.
W74-09257

ENVIRONMENTAL STATEMENTS--ENGINEER REGULATIONS ON PREPARATION AND COORDINATION.
Corps of Engineers, Washington, D.C.
Federal Register, Vol 37, No 22, p 2525-2530, February 2, 1972.

Descriptors: *Administrative agencies, *Legislation, *Environmental effects, *Federal government, Governments, Regulation, Water resources, Water resources development, Planning, Inter-agency cooperation, Environment, Environmental control, Environmental effects.
Identifiers: *Environmental impact statement(EIS), Administrative regulations.

The purpose of this regulation is to facilitate and promote compliance with the requirements of the National Environmental Policy Act of 1969 regarding the preparation and coordination of environmental statements. The regulation outlines procedures to be followed and elements to be included in preparing and processing environmental statements as required by the Act. The regulation applies to all elements of the Corps of Engineers with civil works responsibilities for planning, development and regulation of water resource development and is applicable to both preauthorization and postauthorization project activities. (Flowers-Florida)
W74-09258

CLEAN WATER--A CHALLENGE TO THE NATION, HIGHLIGHTS AND RECOMMENDATIONS OF THE NATIONAL CONFERENCE ON WATER POLLUTION.
Public Health Service, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-09260

REPORT OF PROCEEDINGS CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN NORTH CAROLINA, SECTION

III, KINSTON PUBLIC HEARING MARCH 1, 1973.
North Carolina Board of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 4A.
W74-09275

REPORT OF PROCEEDINGS CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN NORTH CAROLINA, SECTION II, SOUTHERN PINES PUBLIC HEARINGS NOVEMBER 2, 1972.
North Carolina Board of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 4A.
W74-09276

OFFSHORE SHRIMP FISHERIES ACT OF 1973--LEGISLATIVE HISTORY.
U.S. Code Congressional and Administrative News, p 5959-5973, 1973.

Descriptors: *Commercial fishing, *International waters, *Shrimp, *Continental Shelf, *Legislation, International law, Legal aspects, Law of the sea, Foreign waters, Treaties, Shellfish, Lobsters, Fishing, Permits, Fisheries, Federal government, Administrative agencies, Aquatic life, Natural resources.

The Senate Report submitted by the Commerce Committee recommends implementing the United States-Brazil shrimp fishing agreement and enforcing it as to United States fishermen. A history is included of the agreement which consolidates United States interests in maintaining access to disputed coastal waters for United States fishermen and Brazilian interests in insuring that its shrimp resources will not be overexploited. The enactment is necessary in order for the United States to fulfill its obligations under the agreement. An amendment to the bill which would declare the lobster a Continental Shelf fishery resource is recommended. By international agreement, the coastal state has sovereign rights to exploit its shelf resources. The agreement sets a number of annual fishing permits to be issued by the Secretary of Commerce and only permitted vessels may fish in the designated area of agreement. Violators may be penalized up to $10,000. Fishermen who have deposited enforcement reimbursement funds are given priority when applying for permits. Letters are included in which the Department of State and the Department of Commerce recommended the enactment of the bill and other agencies have made no objection. (Hunter-Florida)
W74-09277

FINAL ENVIRONMENTAL STATEMENT, (OFFICE OF SALINE WATER)--FIVE YEAR EXTENSION RESEARCH AND DEVELOPMENT, PUBLIC LAW 92-60.
Office of Saline Water, Washington, D.C.
For primary bibliographic entry see Field 3A.
W74-09280

FLORIDA'S SEAWARD BOUNDARIES--A DILEMMA,
Miami Univ., Fla. Ocean Law Program.
M. S. Scott.
Sea Grant Technical Bulletin, No. 20, January 1972. 114 p, 10 map, 1 append, 233 ref. NOAA 2-35147.

Descriptors: *Florida, *Atlantic Ocean, *Gulf of Mexico, *Ownership of beds, *Boundary disputes, *Submerged Lands Act, Coasts, Low water mark, High water mark, Seashores, Beds under water, Navigable waters, Tidal waters, Jurisidication, State jurisdiction, Federal jurisdiction, Water law, Legal aspects, Judicial decisions, Islands, Federal-state water rights conflict.
Identifiers: Baselines.

Florida has the greatest tidal coastline of any mainland state, approximately 8426 statute miles. However, the location of Florida's ocean boundaries awaits determination. Establishment of these boundaries is important, given the wealth of resources man is now capable of extracting from the ocean floor. Much of the law in this area has grown out of the recent Tidelands Cases. In these cases the Supreme Court held that the United States government had authority over submerged lands seaward of the mean low water mark. Congress reacted by enacting the Submerged Lands Act in 1953, which gave coastal states ownership and proprietary powers over lands under navigable waters for a distance of 3 miles in the Atlantic and Pacific Ocean or 9 nautical miles in the Gulf of Mexico. The matter of boundaries is not yet decided, however, because Florida, in litigation which is still continuing, has claimed the same limit on its Atlantic coast which it was given on its Gulf coast. In addition, Florida's many islands and bays present problems in determining the baseline from which to measure the extent of her territorial waters. (Flowers-Florida)
W74-09281

UTAH ENVIRONMENTAL PROBLEMS AND LEGISLATIVE RESPONSE: PART 1,
Environmental Protection Agency, Denver, Colo. Region VIII.
For primary bibliographic entry see Field 5G.
W74-09282

PROTECTING AMERICA'S ESTUARIES: FLORIDA (PART 2).
For primary bibliographic entry see Field 5G.
W74-09283

APPRAISAL OF AQUATIC PRESERVES IN FLORIDA,
Miami Univ., Fla. Ocean Law Program.
B. H. Dubner.
Report No. 6, November, 1973. 14 p. R/L-5.

Descriptors: *Florida, *Submerged lands, *Beds, *Aquatic environment, *Preservation, *Dedication, Conservation, Aquatic life, Riparian rights, Ownership of beds, Marine animals, Marine plants, Aquatic plants, Marshes, Wetlands, Mangrove swamps, Reefs, Shallow water, Inter-agency cooperation, State governments, Administrative agencies.

A report submitted to the Florida Board of Trustees of the Internal Improvement Fund by the Interagency Advisory Committee on Submerged Land Management is analyzed. Florida owns some 10,000 square miles of submerged lands and the natural systems of these coastal waters are having a difficult time co-existing with man. The report recommends the dedication of exceptional areas of these coastal waters to preserve biological life, to preserve scenic qualities, and to further scientific and educational purposes. The report recommends that the sites for dedication by selected by the Board of Trustees according to recommendations made by various federal and state agencies and integrated by an inter-agency committee. The Board should be responsible for the management of the preserves and should locate the specific preserves by resolution. The Board's adoption and implementation of the report's recommendations are discussed. The Board adopted a concept and management polocy in 1969 which set in motion action on specific aquatic preserve resolutions. It has approved the report's twenty-six recommended preserves and several additional sites. Statutory powers and duties of the Board as a source of implied authority to set up aquatic preserves are discussed. (Hunter-Florida)
W74-09285

THE EAST CHINA SEA: THE ROLE OF INTERNATIONAL LAW IN THE SETTLEMENT OF DISPUTES.
Duke Law Journal, p 823-865, Spring 1973. 153 ref.

Descriptors: *Continental shelf, *Law of the sea, *International law, *International waters, *Oceans, Treaties, Foreign waters, Legal aspects, Ownership of beds, Governments, Water law, United Nations, Exploration, Natural resources, Oil.
Identifiers: *China Sea.

International law has two weaknesses when used as a method of solving international legal disputes. Either the states will not submit the dispute to a third party, or the relevant legal principles may not be sufficiently developed to provide for resolution of the conflict. These weaknesses are manifested in the disputes surrounding exploration rights to the continental shelf of the East China Sea and the ownership of the Senkaku Islands in that sea. The governments of China, Taiwan, South Korea, and Japan claim rights to the continental shelf which conflict with each other. The delicate political situation, especially between China and Taiwan, precludes submission of the dispute to a third party; the law of the territorial sea and the continental shelf is not sufficiently settled to provide a solution. The development and current state of the law of the sea, and how it applies to the conflicting claims of the countries surrounding the East China Sea is discussed. While international legal principles will not be responsible for the resolution of this problem it is encouraging that the rhetoric of international law is used by the participants. (Craig-Florida)
W74-09286

SEABED MINERAL RESOURCE PRODUCTION AND THE FREE MARKET,
J. M. Marcoux.
Natural Resources Law, Vol 6, p 217-248, Spring 1973. 98 ref, 1 append.

Descriptors: *Law of the sea, *Oceans, *Economics, *Resource allocation, *Natural resources, Evaluation, Contracts, Exploration, United Nations, Water law, International waters, Governments, Ownership of beds, Legal aspects, Treaties, International law, Continental shelf.2 (U)2jIdentifiers: Coastal waters.

Laws governing the efficient recovery of mineral resources of seabeds will constitute an important part of the law of the sea. Addressed are two questions with respect to such a mineral recovery law: whether individual profit-maximizing decisions in a free seabed mineral development market are the best means to achieve a socially optimal use of seabed minerals; and whether competitive losses of existing mineral producers, displaced by seabed production, should be compensated. Various countries' proposals for legal controls on seabed mineral production and prices and for the protection of present mineral producers are examined. These proposals and their implications with the experience of the United States in regulation of the oil industry are compared. Utilization of a free-market competitive model for any international seabed authority is proposed. Additionally, the use of a unitization contract is suggested, whereby title to production is pooled among the lessees, to promote conservation of the natural resources. (Craig-Florida)
W74-09287

THIBODAUX PUBLIC HEARING TESTIMONY.
Louisiana Advisory Commission on Coastal and Marine Resources, Baton Rouge.
September 21, 1972. 60 p.

Descriptors: *Louisiana, *Water management, *Water development, *Coasts, *Conservation, Public rights, Estuaries, Estuarine environment, State governments, Administrative agencies,

cology, Natural resources, Water resources, ater resources development, Water policy, anning, Land use, Land development, Land anagement, Fisheries, Wildlife, Oil industry, ecreation, Navigation, Channelization, Pollution fects, Drainage, Flood control, Mineralogy, ississippi River Basin.

blic hearings were held in Thibodaux on Sepmber 21, 1972 to get first-hand information from e citizens of the coastal zone on their perception coastal zone resource problems. Several indusal, environmental and political witnesses ofred testimony. The testimony illustrated the mpetition and demand between those interests hich depend upon an unchanged coastal zone d estuarine environment and those whose elihood is dependent upon a modification of the isting coastal zone. Among those interests and lues at stake are fisheries, wildlife, oil producn, recreation, scenic value, tourism, shipping, vigation and channelization, conservation and eservation of the estuarine environments and ntrol of pollution. Proper management, planning d development were emphasized by state agens as well as drainage and flood control priori-s. Landfill as a result of residential and industridevelopment was cited as an urgent concern, as s proper planning for well developed mineral ources development. (Silber-Florida)
74-09288

R, LAND AND WATER POLLUTION.
Ann. Stat. Ch. 14, secs 11, 12 (Smith-Hurd pp. 1973).

scriptors: *Illinois, *Legislation, *Water law, llution abatement, *Legal aspects, Water poion, Air pollution, Water pollution control, Adnistrative agencies, Public health, Regulation, icial decisions, Remedies, Natural resources, lution effects.
ntifiers: Injunctive relief.

thority is conferred to the Illinois state attorney eral to prevent air, land or water pollution by nmencing an action or proceeding in the circuit rt of any county in which such pollution has n, or is about to be, caused or has occurred, in er to have such pollution stopped or prevented mandamus or injunction. The court shall speci a time within twenty-one days after service of petition, for an answer, and in the interim the ty shall be restrained from continuing such polon pending a hearing before the court. In case default, or after answer, the court shall imdiately inquire into the facts and circumstances plained of. An appeal may be taken from a l judgment in the circuit court in the same nner and with the same effect as appeals taken n any judgment of the circuit court in other acs for mandamus or injunction. (Silber-Florida)
4-09289

NALS AND WATERWAYS.
Ann. Stat., ch. 19, sec 1111, 1121, 1122 (Smith-rd Supp. 1973).

criptors: *Legislation, *Illinois, *Reservoirs, creation, *Governmental interrelations, Water , Rivers, Pollution, Pollution abatement, reation facilities, Wildlife management, Pollu identification, Planning, Administrative agen-, Water pollution, Coordination, Cooperation, elopment, State governments, Inter-agency peration.

ois Department of Conservation is authorized nter into and carry out agreemets with any ncies of the United States government. The ose of such agreements is to insure the perance of non-federal items in the acquisition of , development, operation and maintenance of rovements of the Lincoln Reservoir on the arras River for the purpose of making certain ions of it suitable for public outdoor recreation, including the management of fisheries and wildlife. In the interests of the citizens of the state, immediate efforts shall continue to be taken to clean up the Little Calumet River. This may only be achieved through cooperative efforts of appropriate federal, state and local agencies. To coordinate this effort the Commission on Operation Little Calmet River has been established. The commission shall study and identify the factors relating to the river pollution, coordinate the river clean-up, and develop a handbook of procedures to be used by other communities with similar problems. (Silber-Florida)
W74-09290

SOIL AND WATER CONSERVATION DISTRICT LAW.
Ill. Ann. Stat. Ch. 5, secs 127 .2a, 128, 131b, 131b-1, 131b-6 (Smith-Hurd Supp. 1973).

Descriptors: *Legislation, *Illinois, *Water conservation, *Soil conservation, *Erosion control, Erosion prevention, Land use, Water management, Flood control, Watershed protection, Watershed management, Land management, Reforestation, Farm management, Structures, Environmental engineering, Cultivation sedimentation, Dams, Dikes.

The Illinois Soil and Water Conservation Districts are authorized to formulate regulations governing the use of lands in the interest of conserving soil, soil resources, water and water resources. The districts may also issue regulations to prevent and control damage caused by erosion, flood water and sediment. Before enacting such regulations a landowner's referendum shall be held within each district. The regulations may include provisions for necessary engineering requirements such as construction of terraces, check dams, dikes, and other structures, observation of particular methods of cultivation, seeding and planting of lands with water-conserving and erosion-preventing plants, trees and grasses. They may also include permanent retirement from cultivation of highly erosive areas, and such other measures that may promote conservation of soil and water resources and prevent or control soil erosion. Subdistricts may be formed in a watershed area to develop programs in any phase of flood prevention, flood control, erosion control, floodwater and sediment damage. (Silber-Florida)
W74-09291

DRAINAGE--SEWAGE DISPOSAL; CONTAMINATION OF LAKE MICHIGAN.
Ill. Ann. Stat., Ch. 42, sec. 306 (Smith-Hurd Supp. 1973).

Descriptors: *Drainage, *Legal aspects, *Legislation, *Illinois, Municipal wastes, *Lake Michigan, Sewage disposal, Sewage districts, Sewerage, Waste water disposal.

The following topics are considered: contamination of Lake Michigan by sewage disposal; acquisition and maintenance of sanitary facilities; control of tributary sewer systems; construction standards for tributary sewer systems; and inspection of sewage connections. The board of trustees of any sanitary district is authorized to provide for the disposal of sewage. It is not to be construed to empower said trustees to provide water to a municipality or its inhabitants or to authorize the trustees to flow the sewage into Lake Michigan. Nothing in the act shall be construed as superseding the limiting provisions of the Environmental Protection Act. (Sears-Florida)
W74-09292

REGULATION AND RESTRICTION OF LOCATION AND USE OF STRUCTURES IN REGARDS TO RUNOFF OF STORM OR FLOOD WATERS.
Ill. Ann. Stat., ch. 34, sec. 3151 (Smith-Hurd Supp. 1973).

Descriptors: *Illinois, *Legislation, *Runoff, *Storm runoff, *Floodwater, *Zoning, Local governments, Regulation, Water pollution sources, Flood damage, Flow.

The board of supervisors or board of county commissioners is given the power to regulate and restrict the location and use of buildings, structures and land for trade, industrial, residential, and other uses, and to regulate and restrict the intensity of such uses. They are also empowered to divide the entire county outside the city limits into districts according to the use of land and buildings and other classifications as are necessary, to prohibit uses incompatible with the character of such districts, and to prevent additions and alterations to buildings in such a manner as to avoid these restrictions. One of the primary purposes of this act is to lessen or avoid the hazards to persons and damage to property resulting from the accumulation or runoff of storm or flood waters. (Sears-Florida)
W74-09293

SANITARY DISTRICTS.
Ill. Ann. Stat. Ch. 34, sec. 3131 (Smith-Hurd, Supp. 1973).

Descriptors: *Illinois, *Legislation, *Sewage districts, Sewerage systems, Sewage disposal, Governments, Sewerage, Sanitary engineering.

Any sanitary district organized and created under the laws of the state of Illinois having a population of less than 500,000 and lying wholly or partly within the boundaries of any county which accepts the provisions of 'An Act in relation to water supply, drainage, sewage, pollution and flood control in certain counties' may contract with such county for sewerage service to or for the benefit of the inhabitants of the sanitary district. Any such contract may provide for the periodic payment to the county of a share of the amounts necessary to pay or provide for the expenses of operation of the sewerage systems. Any such contract may be entered into without making a previous appropriation for the expense thereby incurred. If the contract is payable solely from the revenues derived by the sanitary district from its sewerage system, the amounts due under the contract shall be deemed an expense of operating and maintaining the sewerage system of the sanitary district. (Sears-Florida)
W74-09294

FISH PROTECTIVE REGULATIONS.
Ill. Ann. Stat., ch. 56, sec. 2.1 (Smith-Hurd Supp. 1973).

Descriptors: *Illinois, *Fish, *Fish management, *Pollution, *Legislation, Water pollution, Aquatic animals, Minnows, Frogs, Turtles, Mussels, Crayfish, Sewage disposal, Regulation.
Identifiers: Fish protective regulations, Fish ownership, Title to fish.

The ownership of and title to all fish, minnows, frogs, turtles, mussels, and crayfish within the jurisdiction of the State of Illinois is in the State. They may not be taken or killed unless the person so doing acknowledges that the title thereto shall be and remain in the State for the purpose of regulating the taking, killing, possession, use, sale, and transportation thereof. If any person causes any wastes or sewage to be discharged into, or causes or allows pollution of any waters so as to kill aquatic life, the State may bring an action against such person and recover the reasonable value of the aquatic life destroyed. If any person leaves any debris where it shall be liable to be washed into the waters he shall be in violation of the offense of polluting. (Sears-Florida)
W74-09295

REID V. EL PASO CONSTRUCTION CO. (DAMAGES FOR ALTERATION OF DRAINAGE CONDITIONS).
408 S.W.2d 923 (Texas 1973).

Descriptors: *Texas, *Controlled drainage, *Judicial decisions, *Surface drainage, Drainage engineering, Drainage water, Drainage systems, Ditch, Legislation, Legal aspects, State governments, Court decisions, Drainage practices, Drainage effects.
Identifiers: *Natural drainage.

The plaintiff landowners alleged that the defendant El Paso Construction Company had fraudulently concealed evidence of the alteration of natural drainage conditions. The concealment was in connection with three tracts of land which the defendant sold to the plaintiffs. The plaintiffs alleged that rains caused flooding and serious damage to their property. The plaintiffs also asserted an action against both the city of El Paso and Farah Manufacturing Company for the unlawful diversion of water from its natural course in violation of a Texas statute. Farah had constructed a large building which covered several natural arroyos and directed the drainage flow into an artificial conduit. The court noted that any alteration of natural or artificial drainage conditions is not permitted without a prior authorization from the state and held for plaintiffs. (Sperling-Florida)
W74-09296

BEACH AND SHORE PRESERVATION ACT.
Fla. Stat., sec. 161.091 (Supp. 1972).

Descriptors: *Florida, *Beaches, *Shore protection, *Beach erosion, *Legislation, Public benefits, Erosion control, Conservation, Coastal engineering, Administrative agencies, Cost sharing, State governments, Project planning, Hurricanes, Tidal effects.
Identifiers: *Administrative regulations.

A state account is created to carry out the proper state responsibilities in a comprehensive, long range, statewide plan for erosion control, beach preservation, and hurricane protection. The statute provides for disbursements to be made by the division of marine resources of the Florida department of natural resources. It allows the state to undertake projects which are in the interest of the state. Additionally loans or grants can be made to localities for erosion control, beach preservation, and hurricane protection work of an emergency nature. (Sperling-Florida)
W74-09297

WATER RESOURCES-POWERS OF THE COMMISSIONER OF NATURAL RESOURCES.
Minn. Stat. Ann., secs. 105.38, 105.41, 105.42, 105.43, 105.51, 105.52 (Supp. 1973), as amended, ch. 315, secs. 1, 2, 3, 6, 8, ch. 344, secs. 4, 5 (1973) Laws of Minn.

Descriptors: *Water conservation, *Water resources development, *Appropriation, *Water resources, *Water supply, *Administration, Minnesota, Legislation, Project purposes, State governments, Inter-agency cooperation, Water distribution(Applied), Inspection, Water level, Water works, Permits, Construction, Dams, Reservoirs, Regulation.

The duties of the commissioner of natural resources shall include establishing and maintaining a statewide system to gather, process and disseminate information on the availability, distribution, quality and use of the state of Minnesota's waters. The appropriation and use of state waters is regulated through the issuance of permits, obtained from the commissioner, who may promulgate conditions for permits as he may find advisable or necessary in the public interest. The commissioner may examine any installation which appropriates or uses surface or underground water and the owner shall supply information concerning the installation. Also, application for establishment of lake levels and the maintaining of natural ordinary high levels may be made to the commissioner, by any public authority or by a majority of the riparian owners thereon. The statute also regulates dams, and places authority for their repair and reconstruction with the commissioner. The commissioner can examine dams and reservoirs, order repairs and issue orders stating reasonable time periods in which such repairs must be completed, at the owner's expense. Further, the commissioner is also given the authority to require owners of artesian wells to control wastes. (Sutton-Florida)
W74-09298

MONTGOMERY V. ELLIS (ACTION SEEKING TO ENJOIN STREAM CHANNELIZATION).
364 F. Supp. 517-535 (N.D. Ala. 1973).

Descriptors: *Judicial decisions, *Streams, *Channelization, *Environmental effects, *Project planning, *Alabama, Construction, Cost-benefit ratio, Dams, Environment, Watersheds(Basin), Water storage, Costs, Flood control, Alternative planning, Flood plain zoning, Insurance, Non-structural alternatives, Recreation, Legal aspects, Federal government, Administrative agencies, Water law, Water policy, Water management, Standards, Regulations.
Identifiers: Environmental Impact Statements, National Environmental Policy Act(NEPA), Injunctive relief.

Action is by a landowner against officials of the Soil Conservation Service (Service) of the Department of Agriculture, seeking to enjoin the implementation or construction of a stream channelization project. The District Court held the filed statement to be insufficient as an environmental impact statement, and that the Service had failed to give effect to the National Environmental Policy Act requirement that all federal agencies exercise a continuing responsibility regarding projects which might affect the environment. In addition, service officials had failed to follow their own departmental regulations in approving this project. The Court further held that the defendants would be enjoined from construction, installing, or further authorization or financing any stream modification or channelization of the creek in question until an adequate environmental impact statement was prepared and circulated. The project was ordered to be reappraised so as to reduce adverse environmental effects and to develop a more favorable cost-benefit ratio. (Ritchie-Florida)
W74-09299

PROTECTION AND IMPROVEMENT OF WATERS: POLLUTION CONTROL.
Me. Rev. Stat. Ann., Vol 16, tit. 38, secs. 411-424 (Supp. 1973).

Descriptors: *Maine, *Water pollution control, *Legislation, *Discharge, *Environmental control, Abatement, Outfall sewers, Interceptor sewers, Wastes, Refuse, Waste treatment, Permits, Pollutants, Phosphates, Oil pollution, Water quality control, Sewage treatment, Inland waterways, Water quality, Water quality standards.
Identifiers: Environmental protection, Forest product refuse.

Maine's legislature passed this pollution control statute in order to establish a state commission which would cooperate with federal agencies to control pollution within its borders. The state authorized money grants to localities for waste treatment systems, interceptor systems and outfalls. Additionally, grants were authorized for the funding of a pollution abatement construction program by municipalities. The statute prohibits discharges without first obtaining a license from the state. Provisions for the license's application, terms, conditions, fees, and hearings were established. Generally the licenses for discharge of any pollutants will be granted only if it will not lower the quality of the body of water in which it is discharged, keeping in mind economic and social development considerations. Discharges of oil, forest product refuse and metal scraps is strictly prohibited as is any cleaning agent containing phosphate. Likewise, discharge of wastes from water crafts is restricted in the inland waters or banks of the state of Maine. Also voluntary water quality monitors may be appointed by the Commissioner of Environmental Protection to continually test and provide information on water quality to the Commissioner. (Daniels-Florida)
W74-09300

WETLANDS.
Md. Code Ann., art. 66C, sec. 718-731 (Supp. 1973).

Descriptors: *Legislation, *Maryland, *Wetlands, *Erosion control, *Riparian rights, *Conservation, Reclamation, Avulsion, Accretion, Dredging, Filling, Boundaries, Bank erosion, Navigable waters, Land use, Land management.

The natural person who is a landowner of property abutting on navigable waters is entitled to all natural accretions to his land, and to reclaim fast land lost by erosion or avulsion and to make improvements into the waters for the purposes of protecting his shore against erosion and preserving his access to navigable waters. Riparian owners may apply to the Maryland State Board of Public Works for a license to dredge and fill on state wetlands. Private wetlands may be lawfully used for conservation of soil, vegetation, water, fish, shellfish and wildlife, as well as for trapping, hunting, fishing and shellfishing where otherwise legally permitted. The Secretary of Natural Resources shall delineate the landward boundaries of all wetlands within the state. Applications to conduct activities not permitted by the rules and regulations may be made to the Secretary. (Silber-Florida)
W74-09301

U.S. V. POLLMANN (DETERMINATION OF INDIAN LANDS UNDER LAKE).
364 F. Supp. 995-1004 (D. Mont. 1973).

Descriptors: *Treaties, *Lakes, *Public rights, *Judicial decisions, *Indian reservations, *Legislation, Navigation, Surface water, *Montana, Fisheries, Administration, Permits, Third party effects, Political aspects, Water utilization, Water management, Standards, Legal aspects, Federal reservations, Water law, Water policy, Submerged land, Public rights, Regulation, Federal jurisdiction, Water rights.

This was a test case to determine whether 18 U.S.C. sec. 1165 would be applicable to a private individual fishing on a portion of a lake given to Indian tribes through a treaty. The court held the word 'land' used within the statute was to mean submerged soil beneath a lake, or to include surface water itself. Trespass upon Indian land for purposes of fishing was not ambiguous language and such language clearly included fishing from a boat. The right granted Indian tribes by treaty to exclusive fishing rights on the southern half of the lake included the right to exclude others from fishing and was not in conflict with the public right to use the surface of the lake for navigation. Although the court found a violation of the statute had occurred, they found the defendant not guilty stating that as this was a test case and willful knowledge was an essential element of the crime he could not be adjudicated guilty because he had sought an attorney in good faith, for the purpose of securing advice about the lawfulness of his possible future action. As he reported all material facts accurately to the attorney, and acted strictly in accordance with his advice, he could not be found guilty of a willful violation of the law. (Sutton-Florida)
W74-09302

DIMENTATION POLLUTION CONTROL
CT OF 1973.
C. Gen. Stat., secs. 113A-50 thru 113A-66
973).

scriptors: *Sediment control, *Legislation, Iultiple-purpose projects, *North Carolina, diment discharge, Sediment load, Watershed nagement, Bank erosion, Soil erosion, Judicial ects, State agencies, Enforcement, Regula-ns, Water law, State governments, Local vernments, Rivers, Lakes, Land management, nd development, Water pollution control, ater pollution sources.
ntifiers: *Injunctive relief.

e authority of this North Carolina act is dicated upon the need to control the pollution blem created by the sedimentation of streams, es and other waters and the public interest in sion and sedimentation control. The creation, ninistration, and enforcement of a program to crease pollution caused by sedimentation are posed. The act provides for the creation of a iment control commission within the North rolina Department of Natural and Economic sources. Specifications are set forth for mem-ship and compensations. The Commission is rged with the promulgation, development and ninistration of the state's erosion and sedimen-on control program and shall develop rules and ulations implementing the program. Public rings will be held prior to any adoption or revi-n of the rules and the criteria to be employed such adoption or revision are outlined. The retary of Natural and Economic Resources ll aid in program administration. Restrictions delineated respecting land-disturbing activi-. The Commission may promulgate procedures consideration of local control programs and vide for the enforcement of the provisions by cting civil and criminal penalties. (Proctor-rida)
4-09303

NTAMINATION OF WATERS.
I. Rev. Stat. Ann., ch. 211:71 to 211:74 (Supp. 2).

scriptors: *Water pollution, *Aquatic environ-nt, *Waste water(Pollution), *Water conserva-, *Water supply, *New Hampshire, Legisla-, Water policy, Statute, Water resources elopment, Public health, Administration, Wil-e, Environmental effects, Water pollution rces, Waste disposal, Coasts, Water pollution cts, Inland waterways.

atute was enacted for the prevention of inland coastal water contamination. Whoever unlaw-discharges contaminants into these waters be liable for any damage to fish or other atic life and wildlife. Any such damage shall be stigated by the director of the New Hampshire artment of fish and game, or his agent, and he determine the party responsible and then pute the damages based on tables promulgated he department or by such other means as he ns reasonable and accurate. If the offense mes one of a continuing nature, the director notify any other state department authorized eek injunctive relief against water pollution. r the director determines that the damage to other aquatic life and wildlife so warrants, he request the attorney general to institute an n at law for damages caused by such con-nation. (Sutton-Florida)
-09304

HT OF PRIVATE PARTY TO MAINTAIN ION TO ENFORCE PROVISIONS OF ERS AND HARBORS ACT OF 1899,
hulenberger.
LR Fed. 636 (1973). 22 p.

Descriptors: *Judicial decisions, *Federal government, *Legal aspects, *Pollution abatement, *Water policy, *Rivers and Harbors Act, Waterways, Streams, Rivers, Navigable waters, Navigation, Pollution sources, Environmental effects, Water rights, Public rights, Environmental sanitation, Industrial pollution, Waste dumps, Sewage discharge, Sewage disposals, Administrative agencies.

This annotation collects cases dealing with the right of a private party who claims no injury to a navigational interest to bring an action against an alleged polluter of the nation's waterways, or against the alleged polluter and governmental officials, in attempted enforcement of provisions of the Rivers and Harbors Act of 1899. Various sections of that Act make it unlawful to deposit refuse in navigable waters and their tributaries unless a permit to do so has been issued to the polluter. The Act also provides that half of the fine assessed shall go to the person supplying the information concerning the violation. Idle until the 1970's, this statute enables private citizens to bring a 'qui tam' action against the violator if the government failed to prosecute. No private damages need be shown by the plaintiff, and the suit is brought by the plaintiff for himself as well as for the government. The United States Supreme Court has endorsed this 'qui tam' action as 'helping to ensure against laxity by public officials in enforcing statutes effectuating important public policies.' Various lower federal courts have put procedural impediments in the citizen's way, especially regarding standing, resulting in the informant being only the government's witness in prosecutions rather than permitting him his own cause of action. (Silber-Florida)
W74-09305

LIABILITY OF WATER SUPPLIER FOR DAMAGES RESULTING FROM FURNISHING IMPURE WATER,
J. T. Bockrath.
54 ALR3d 936 (1973).

Descriptors: *Judicial decisions, *Potable water, *Public utilities, *Municipalities, *Legal aspects, State governments, Jurisdiction, Water rights, Water policy, Water demand, Water supply, Domestic water, Environmental sanitation, Public health, Water purification, Water control, Water quality, Water quality control, Water utilization, Water distribution, Contaminants, Pollutants, Administrative agencies.

This annotation collects the cases in which the liability of a private municipal water supplier for damages resulting from furnishing impure water has been determined. Sound public policy makes incumbent upon water suppliers a duty of a high degree of care in furnishing a supply adequate in quantity and wholesome in quality. Damage from impure waters most often takes the form of disease or poisoning. Actions for these injuries have taken many forms, the most popular being negligence, implied warranty and warranty. Depending upon the individual jurisdiction involved, municipal water suppliers are held to be public utilities or acting in a proprietary fashion. Exceptions to a municipality's liability for furnishing impure water have arisen when the agency, acting in a governmental capacity, supplied water in an emergency situation to avoid a health hazard. Generally, the presumption of negligence or breach of warranty is against the supplier, but can be rebutted by establishing facts and circumstances which would excuse or acquit the utility. (Silber-Florida)
W74-09306

WILD AND SCENIC RIVERS ACT AMENDMENTS PART 1.
Hearings--Before the Subcomm on National Parks and Recreation of the Comm on Interior and Insular Affairs, U.S. House of Representatives, 93d Cong, 1st Sess, June 11, 12, 1973. 161 p.

Descriptors: *Federal government, *Wild River Act, *Legislation, *Scenery, Decision making, Water policy, Recreation, Water conservation, Water resources development, Project planning, Administration, Budgeting, Coordination, Social aspects, Project purposes, Electric power industry, Regulation, Engineering structures, Allotments, Water allocation(Policy), Government finance, Rivers, Aesthetics, Conservation, Running waters.
Identifiers: *Congressional hearings, Administrative regulations.

One amendment to the Wild and Scenic Rivers Act deals with increased appropriation for so-called instant rivers which were added to this system in 1968. Other amendments concern specific additions to the study sections of the act which would permit several rivers, or segments of rivers, to be studied for possible inclusion into the Scenic Rivers System. Congressmen from several states made statements concerning the inclusion of rivers in their respective states in the National Scenic Rivers System. The administration has proposed a bill which would prohibit the Federal Power Commission from licensing any project directly affecting any of the twenty-seven rivers listed in the act for study. Another provision would prohibit any federal agency from assisting in the construction of any water resource project that would have a direct and adverse effect on a river's wild or scenic values. Another provision would prevent federal agencies from recommending authorizations or appropriations for construction of water resource projects without reporting potential conflicts with the purposes of the Wild and Scenic Rivers Act. (Sperling-Florida)
W74-09307

TO AMEND THE WILD AND SCENIC RIVERS ACT.
Hearing--Subcomm. on Public Lands, Comm. on Interior and Insular Affairs, U.S. Senate, 93d Cong, 1st Sess, July 16, 1973. 74 p, 2 map.

Descriptors: *Wild Rivers Act, *Legislation, *Rivers, *Watershed management, *Recreation, *Pollution prevention, Water law, Legal aspects, Federal government, Water policy, Administrative agencies, Coordination, Cooperation, Wildlife management, Fishlife, Land management, Land use, Navigable waters, Conservation, Natural resources, Water resources development, Pollution control, Project planning, Streams.

This bill would add certain rivers in the state of Michigan to the national wild and scenic rivers system. Also proposed are additions to the system of rivers in Wisconsin. Various witnesses spoke as to the beneficial aspects of these proposed additions to the system, citing water and forest conservation and management as paramount interests. Conservation of the nation's land and water resources and recreational aspects as well as fishlife and wildlife preservation and protection were also cited. In addition, these rivers would enjoy the protection against pollution and overdevelopment which characteristically blemish non-protected waterways. Aggressive federal-state interaction and cooperation will be a beneficial effect of the proposed addition to the scenic river system. Results of various field investigations concerning several rivers already in the system were entered into the record as evidence of the value of the program. (Silber-Florida)
W74-09308

REPLACEMENT OF THE AMERICAN FALLS DAM IN IDAHO, PART 1.
Hearing---Before the Subcomm on Water and Power Resources of the Comm on Interior and Insular Affairs, U.S. House of Representatives, 93d Cong, 1st Sess, October 6, 1973. 119 p.

Descriptors: *Idaho, *Federal government, *Legislation, *Dam construction, *Hydroelectric

plants, Water supply, Flood control, Irrigation systems, Irrigation water, Irrigation efficiency, Water demand, Water sources, Reservoir operation, Reservoir storage, Water distribution(Applied), Wildlife management, Conservation, Water yield improvement, Water yield, Safety, Economic justification, Government finance, Participating funds.
Identifiers: *Congressional hearings.

The proposed legislation would authorize the Secretary of the Interior to enter into agreements with non-federal agencies for the replacement of the American Falls Dam in Idaho which also serves a reservoir and powerplant. The existing dam has been determined to be unsafe, and the reservoir is operating two thirds below its capacity. Nine-hundred-thousand acres of land receive irrigation from the reservoir. Constraints on operation of the dam will pose serious threats to the agricultural economy of southern Idaho, and also to the recreation, fish and wildlife, flood control, and hydroelectric power functions served by the reservoir system. The roadway on the crest of the existing dam is the only crossing within an eighty-mile reach of the river. The financing of the dam would be private by an appropriate water users agency. Ownership would be transferred to the federal government for operation and maintenance. The water users agency would be authorized to contract with the power company for use of the water to defray construction expenses. (Sperling-Florida)
W74-09309

PROPOSED WILD AND SCENIC CHATTOOGA RIVER AND THE CONVEYANCE OF CERTAIN PUBLIC LANDS.
Hearings---Subcomm on Public Lands, Comm on Interior and Insular Affairs, U.S. Senate, 93d Cong, 1st Sess, October 10, 1973. 108 p.

Descriptors: *Legislation, *Water law, *Rivers, *Legal aspects, *Federal government, Recreation, Conservation, Water management, Water development, Water policy, Natural resources, Water resources, Water resources development, Project purposes, Planning, Long-term planning, Scenery, Wild rivers, Scenic easements, Wildlife conservation, Land management, Land development, Water utilization.
Identifiers: *Chattooga River.

The proposed designation of the Chattooga River as wild and scenic and the conveyance of certain other public lands are discussed. The proposed bill notes the fundamental purposes of such a designation, the purposes being to conserve the river's natural and scenic values and to provide for their use and enjoyment by the public in perpetuity. Testimony regarding the proposals was submitted and ranged from comments on feasibility and development possibilities to concurrence on the ideas embodied within the proposed legislation by the President's Office. The remainder of the hearings and testimony introduced regarded transfer and conveyance of certain public lands held by the United States to various state and local political agencies as well as to several corporations and religious entities. The sites of said proposed conveyances include lands in Alaska, Idaho, Oregon, New Mexico, and Arizona. (Silber-Florida)
W74-09310

A BILL TO AMEND THE OUTER CONTINENTAL SHELF LANDS ACT AND TO AUTHORIZE THE SECRETARY OF THE INTERIOR TO REGULATE THE CONSTRUCTION AND OPERATION OF DEEPWATER PORT FACILITIES,
Senate Bill 1751, 93d Cong, 1st Sess (1973). 19 p.

Descriptors: *Legislation, *Oil, *Oil industry, *Harbors, *Continental shelf, Construction, Permits, Environment, Environmental effects, Ships, International waters, Navigation, Mineralogy, Natural resources, Public health, Coasts, Exploration, Exploitation, Penalties(Legal), Water quality, Water quality control, Standards, Regulation, Federal government, Oceans, Sea water, Navigation, Ports, Structures, Environmental engineering, Water policy, Water utilization.
Identifiers: *Deepwater ports.

This bill, to be cited as the Deepwater Port Facilities Act of 1973, amends the Outer Continental Shelf Lands Act. It provides that the Secretary of the Interior shall prescribe such rules and regulations as may be necessary to accomodate the exploration and exploitation of the oil and gas and other mineral resources of the Outer Continental Shelf with construction and operation of deepwater port facilities licensed by him. This is necessary due to the inadequacy of onshore port facilities to accommodate some of the large vessels increasingly used in ocean shipping. It is also designed to eliminate the environmental hazards inherent in the increasing traffic in United States harbors and the resulting danger to public health. No citizen may construct, operate or make any significant addition to a deepwater port facility without first receiving a license from the Secretary. The Secretary may issue the license if it is determined that the applicant is financially responsible, that the construction and operation will not interfere with navigation, and that the facility will be operated so as to minimize adverse environmental effects. (Ritchie-Florida)
W74-09311

A BILL TO AMEND THE OIL POLLUTION ACT, 1961 (75 STAT. 402), AS AMENDED TO IMPLEMENT THE 1969 AND 1971 AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF THE POLLUTION OF THE SEA BY OIL, 1954, AS AMENDED; AND F OR OTHER PURPOSES,
House Bill 5451, 93d Cong, 1st Sess (1973). 13 p.

Descriptors: *Legislation, *Oil, *Oil pollution, *Oil spills, International waters, Water pollution, Water pollution sources, Water pollution control, Ships, Harbors, Treaties, International law, Water law, Coasts, Oily water, Oil wastes.

The Oil Pollution Act Amendments of 1973, repeal, amend, deplete and redesignate numerous sections of the Oil Pollution Act of 1961. Also numerous provisions are added, including a definition of 'instantaneous rate of discharge of oil content,' which shall mean the rate of discharge of oil in liters per hour at any instant divided by the speed of the ship in knots at the same instant. The discharge of oil or oily misture from a ship is prohibited unless the instantaneous rate of discharge of oil content does not exceed sixty liters per mile. For a ship other than a tanker, the oil content must also be less than one hundred parts per one million parts of the mixture and the discharge must be made as far as practicable from land. For a tanker, except discharges from machinery space bilges which are governed by the above provisions, the total quantity of oil discharged on a ballast voyage must not exceed one part in fifteen thousand of the total cargo-carrying capacity, and the tanker must be more than fifty miles from the nearest land. Compliance with tanker construction specifications is required and the Secretary of State may deny access to foreign vessels not meeting those requirements. (Ritchie-Florida)
W74-09312

A BILL TO ASSURE THAT THE PUBLIC IS PROVIDED WITH SAFE DRINKING WATER, AND FOR OTHER PURPOSES.
House Bill 5368, 93d Cong, 1st Sess (1973). 19p.

Descriptors: *Federal government, *Legislation, *Potable water, *Public health, Water quality, Water quality control, Standards, Regulation, Administrative agencies, State governments, Municipalities, Water policy, Water supply, Water demand, Water purification, Treatment facilities, Pollution control, Navigable waters(Drinking water), Environmental sanitation, Water management, Water distribution.

The Safe Drinking Water Act of 1973 takes legislative notice that potentially hazardous drinking water is reaching many consumers due to inadequate treatment and distribution facilities, and a lack of sufficient information and technology to adequately treat raw water to assure its potability. The Act recognizes that the primary responsibility and enforcement authority for ensuring the quality of public water supplies has rested and should continue to rest with state and local governments. The federal government has the responsibility for establishing minimum national primary drinking water standards for all public water systems. The Administrator for the Environmental Protection Agency shall establish such standards which are requisite to reasonably protect the public health and welfare, except the Administrator shall not prescribe the addition of any substance other than for the purpose of treating contaminants. Included shall be standards for the adequate monitoring and reporting of water quality. When the Administrator determines an imminent hazard exists, a condition which could result in a serious risk to public health, he may petition the appropriate United States District Court to order such action as is necessary to eliminate the imminent hazard. (Silber-Florida)
W74-09314

RECENT FEDERAL LEGISLATION SIGNIFICANT IN ENVIRONMENTAL PLANNING PROGRAMS OF THE STATE OF TEXAS.
Texas Law Inst. of Coastal and Marine Resources, Houston.
Available from the National Technical Information Service as COM-73-10617 $3.00 in paper copy, $1.45 in microfiche. February 1973. 19 p.

Descriptors: *Legislation, *Federal government, *Coasts, *Channels, Pollutants, Navigable waters, Oceans, Sea water, Federal Water Pollution Control Act, Water pollution, Water pollution control, *Texas, Ships, Water quality, Water quality standards, Structures, Structural design, Harbors.

Provisions are summarized and the effects described of the more important recently enacted federal statutes affecting Texas' environmental plans and programs. Some of the Acts alter existing law, others supersede state action, and several provide federal financial assistance for state and local programs. The purpose of the Ports and Waterways Safety Act of 1972 is to establish vessel traffic control systems in congested areas and to promote standards for vessels carrying materials which are potentially hazardous to the marine environment. The Federal Water Pollution Control Act of 1972 is intended to eliminate the discharge of all pollutants into the navigable waters of the United States by 1985 and to achieve an interim water quality suitable to protect fish, wildlife and water recreation. The purpose of the Marine Protection, Research, and Sanctuaries Act of 1972 is to regulate dumping of material which might adversely affect human health, and to provide for designation of marine sanctuaries. The Coastal Zone Management Act of 1972 is intended to provide federal grants on a co-operating basis with states for the development and administration of coastal zone management program. (Sears-Florida)
W74-09316

SANITATION AND PUBLIC HEALTH PLANNING,
Escola Nacional de Saude Publica e de Medicina Tropical, Lisbon (Portugal).
For primary bibliographic entry see Field 5G.
W74-09317

SUMMARY-DIGEST OF FEDERAL WATER WS AND PROGRAMS,
tional Water Commission, Arlington, Va.
sale by the Superintendent of Documents U.S. vernment Printing Office, Washington, D.C. 02 Price $1.75. J. L. De Weeidt and P. M. Glick, tors 1973. 205 p.

scriptors: *Water resources development, ater conservation, *Watershed management, ter quality control, *Flood plain zoning, Water, ter supply, Land development, Competing s, Water yield improvement, Consumptive use, reation, Federal-state water right conflicts, ter pollution control, Water rights, Navigation.

mmaries are presented of water and water re- d programs and laws administered by the eral government. Such programs include re- d land use planning, research and data collec- , navigation, maintenance of channels and er structural improvements, and watershed agement. They also encompass structural sures to contain flood flows, land treatment sures to retard runoff, and disaster assistance. there are water supply programs to make er available for agricultural, industrial and estic uses, as well as measures for conserving increasing water supplies. Water quality, the ention of pollution, management and develop- t of fish resources, and recreation are still r aims of federal agencies and programs. This me is a summary of the laws providing for all e programs as well as legal doctrines and their cial development concerning navigability and gable waters, apportionment of interstate er, and reserved water rights. (See also W74-6) (Sperling-Florida)
-09318

ERNATIONAL FIELD YEAR FOR THE AT LAKES.
primary bibliographic entry see Field 2H.
-09350

IRONMENT: A NEW FOCUS FOR LAND- PLANNING.
onal Science Foundation, Washington, D.C.
primary bibliographic entry see Field 4A.
-09412

FUTURE OF THE URBAN HABITAT,
ornia Univ., Los Angeles.
edmann.
Environment: A New Focus for Land Use ning, National Science Foundation, Washing- D.C., Report NSF/RA/E-74-001, p 57-82, Oc- , 1973. 1 tab, 74 ref.

riptors: *Urbanization, *Suburban areas, ironment, *Environmental control, ernmental interrelations, Transportation, lation, Regional development, Resource gement, Community development, Econo- of scale, Social change, Social adjustment.
ifiers: Suburbanization.

onstant increase in suburbanization, and the sponding increase in size and decrease in y of the population surrounding the urban has necessitated a new conceptual work for metropolitan areas, i.e. urban field: multicentered region having relatively low y, whose form evolves from a finely articu- network of social and economic linkages. 30 odd urban fields existing today encompass f the population and have areas as large as 5,000 sq. miles. The expanse of the urban due to the desire for individual space will itate the substitution of mobility for place in hing a large diversity of choice. Mass trans- ion systems will be incapable of delivering obility required to these sprawling, thinly ited areas. The automobile will maintain its onal importance in society. The present trend toward formation of large Metrocenters to dispense goods and services will accelerate and such centers will comprise a complex economic network with the urban center. Because the fundamental social relationships are not as visible in the urban field as in the city, there has been a general decline in civic loyalty which has led to difficulties in governance especially when addressing problems of a regional scale. Solutions to the problems of governance include increased planning and control by the State governments, transformation of Councils of Governments into multipurpose regional governments, and a tiered hierarchy of multipurpose governments arranged according to a principle of territorial specialization. (See also W74-09412) (LaPointe-North Carolina)
W74-09413

LAND-USE INSTITUTIONS IN THE WASHINGTON-BALTIMORE REGION-A MIRROR FOR METROPOLITAN AMERICA,
Carnegie Institution of Washington, Washington, D.C.
E. A. Ackerman, R. G. Dyck, and A. E. Shidler.
In: Environment: A New Focus for Land Use Planning, National Science Foundation, Washington, D.C., Report NSF/RA/E-74-001, p 83-125, October, 1973. 9 fig, 3 tab, 57 ref.

Descriptors: *Land use, *Land development, *Governmental interrelations, Planning, Zoning, Environmental control, Transportation, Employment opportunities, Decision making, Jurisdiction, Water management, Urbanization, Public access, District of Columbia, Maryland.
Identifiers: *Washington(D.C.), *Baltimore(Md.), Unified planning, Metropolitan region.

The Washington-Baltimore metropolitan region is currently undergoing rapid growth. In the city of Washington, a variety of public planning bodies have been established over the years, but, by and large, the planning has been sporadic, piecemeal, and very unpredictable. Of two possible decision sequences, the balanced sequence, initially strong in public participation, has rarely been used because the key ingredients of comprehensive planning and public regulation of land use have only infrequently been employed in the metropolitan region. Land use regulation and management agencies in the Washington Metropolitan Area are fragmented into a myriad of multicounty, county and local commissions, each with particular responsibilities and activities. One conceptual model for the metropolitan area consists of four zones of development with different relationships among the responsible institutions in each. The recognition of the different characteristics of these zones, and the distinction between local decisions and county or zonal decisions allows for integrated or unified planning. Mobility, housing, environmental enhancement, and basic employment support are assessed to determine whether the present process of land development does attain certain social and economic objectives. Performance in all these areas have been substandard. To accomplish unified planning three alternatives are possible: (1) a continuation of current institutions with local additions and improvements, (2) a regional agency for Washington and one for Baltimore, (3) the assumption of greater powers for land development by the States of Maryland and Virginia. (See also W74-09412) (LaPointe-North Carolina)
W74-09414

LAND-USE RESEARCH ISSUES SUGGESTED BY A NATIONAL URBAN GROWTH STRATEGY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Urban Studies and Planning.
For primary bibliographic entry see Field 4A.
W74-09415

CONFLICTS IN LAND USE,
Ross, Hardie, O'Keefe, Babcock, McDugald and Parsons, Chicago, Ill.
For primary bibliographic entry see Field 4A.
W74-09416

ECONOMIC POLICIES, ENVIRONMENTAL PROBLEMS, AND LAND USE,
California Univ., Riverside.
For primary bibliographic entry see Field 6B.
W74-09417

UNIVERSITY RESEARCH AND PRACTICE: AN INSTITUTIONAL CONFRONTATION,
California Univ., Los Angeles. School of Architecture and Urban Planning.
D. Dubbink, and I. Reiff.
In: Environment: A New Focus for Land Use Planning, National Science Foundation, Washington, D.C., Report NSF/RA/E-74-001, p 249-263, October 1973. 7 ref.

Descriptors: *Research, *Research priorities, *Institutions, *Universities, *Environment, Specializations, Communication, Grants, Management, Planning, Local governments.

Discussions with university researchers and practitioners in environmental management agencies have revealed minimal communication and some degree of animosity between the two groups. Presumption of eager university involvement in practical problem solving did not hold true. The university reward system places little value on pragmatic problems, while civil agencies often shun innovative ideas that would disturb organizational integrity. Value conflicts arise out of the university researchers' totally objective 'value-free' methodology. Ideal studies generate many difficulties when attempts are made to apply them to real world problems, making civil personnel wary of applying new technologies. Institutional differences also mediate against rapport between university and local government. Time frames differ from years for the researcher to days and weeks for the practitioner. The university publication ethic tends to view practitioner-related research as unproductive time with little value in tenure considerations. Civil agencies tend to stress durability and patience, not technological innovation. Solving environmental problems with appropriate academic specialists and government agencies can be a severe problem. In spite of the difficulties, however, more research must be directed to present practical needs. Recommendations proposed are: (1) funding agency should monitor independently the quality of cooperative research relationships to insure their authenticity; (2) community service skills should be criteria for academic advancement; (3) research should be of a deliberately iterative nature, giving the practitioner a reduced time span from problem definition to workable solutions; (4) nonuniversity research could be improved through federal support. (See also W74-09412) (LaPointe-North Carolina)
W74-09421

RURAL WATER SYSTEM DESIGNED FOR SUBURBAN USE,
For primary bibliographic entry see Field 5F.
W74-09519

UNIVERSITY STUDENTS IMPLEMENT PUBLIC POLICY RURAL COMMUNITY ACTION WITH A WATER DEVELOPMENT PROJECT,
Case Western Reserve Unit., Cleveland, Ohio. Urban and Environmental Studies.
For primary bibliographic entry see Field 5G.
W74-09557

URBAN PUBLIC POLICY AND POLITICAL INSTITUTIONS FOR WATER QUALITY MANAGEMENT ON LAKE ERIE: YEAR TWO,
Battelle Columbus Lab., Ohio.
For primary bibliographic entry see Field 5G.
W74-09653

WASTE MANAGEMENT RESEARCH.
For primary bibliographic entry see Field 5D.
W74-09663

AGRICULTURE IN THE ENVIRONMENT,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-09664

IMPLICATIONS OF THE PERMIT PROGRAM IN THE POULTRY AND ANIMAL FEEDING INDUSTRY,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 5G.
W74-09667

APPLICATION OF IOWA'S WATER POLLUTION CONTROL LAW TO LIVESTOCK OPERATIONS,
Iowa State Dept. of Health, Des Moines.
For primary bibliographic entry see Field 5G.
W74-09668

A REVIEW OF PUBLIC AND PRIVATE LIVESTOCK WASTE REGULATIONS,
Missouri Univ., Columbia.
For primary bibliographic entry see Field 5G.
W74-09669

IMPLICATIONS OF STATE ENVIRONMENTAL LEGISLATION ON LIVESTOCK WASTE MANAGEMENT,
Economic Research Service, Washington, D.C. Farm Production Economics Div.
For primary bibliographic entry see Field 5G.
W74-09670

POTENTIAL CITIZEN INITIATED LEGAL ACTION AGAINST AGRICULTURAL POLLUTION,
West Virginia Univ., Morgantown. Div. of Resource Management.
For primary bibliographic entry see Field 5G.
W74-09671

DAIRY FARMER CONCERNS OF LAWS AND REGULATIONS AFFECTING ANIMAL WASTE MANAGEMENT,
National Milk Producers Federation, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-09672

OPERATIONAL PROBLEMS OF POULTRY PRODUCTION RELATED TO ENVIRONMENTAL QUALITY,
For primary bibliographic entry see Field 5D.
W74-09689

MANAGING WATER RESOURCES: BASIC CONSIDERATIONS AND PROBLEMS,
San Francisco Water Dept., Calif.
For primary bibliographic entry see Field 6B.
W74-09734

AN INFORMATION SYSTEM FOR THE MANAGEMENT OF LAKE ONTARIO,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 2H.
W74-09752

STATE STANDARDS FOR MERCURY AND HEAVY METALS.
For primary bibliographic entry see Field 5G.
W74-09767

6F. Nonstructural Alternatives

FLOOD PLAIN INFORMATION: OHIO RIVER, BROOKE COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09354

FLOOD PLAIN INFORMATION; POCOTALIGO RIVER-TURKEY CREEK-CANE SAVANNAH CREEK-GREEN SWAMP-SHOT POUCH CREEK-ROCK BLUFF SWAMP, SUMTER COUNTY, SOUTH CAROLINA.
Army Engineer District, Charleston, S.C.
For primary bibliographic entry see Field 4A.
W74-09355

FLOOD PLAIN INFORMATION; WILKESBORO AND NORTH WILKESBORO, NORTH CAROLINA; YADKIN RIVER AND REDDIES RIVER.
Army Engineer District, Charleston, S.C.
For primary bibliographic entry see Field 4A.
W74-09356

FLOOD PLAIN INFORMATION; KIT AND NORTHEAST CREEKS; RESEARCH TRIANGLE AREA, DURHAM AND WAKE COUNTIES, NORTH CAROLINA.
Army Engineer District, Wilmington, N.C.
For primary bibliographic entry see Field 4A.
W74-09357

FLOOD PLAIN INFORMATION; REEDY RIVER, RICHLAND CREEK, GREENVILLE COUNTY, SOUTH CAROLINA.
Army Engineer District, Charleston, S.C.
For primary bibliographic entry see Field 4A.
W74-09358

ECOLOGICAL RIVER BASIN MANAGEMENT,
National Parks and Conservation Association, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-09559

6G. Ecologic Impact Of Water Development

ENVIRONMENTAL STATEMENTS--ENGINEER REGULATIONS ON PREPARATION AND COORDINATION.
Corps of Engineers, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-09258

RAYSTOWN LAKE--RAYSTOWN BRANCH JUNIATA RIVER, PENNSYLVANIA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 8D.
W74-09262

PROPOSED IRRIGATION DISTRIBUTION SYSTEM FOR POND-POSO IMPROVEMENT DISTRICT (PL 984), KERN COUNTY, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Mid-Pacific Regional Office, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W74-09263

BEACH EROSION CONTROL STUDY ON MANATEE COUNTY, FLORIDA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 4A.
W74-09264

APPLICATION OF SEWAGE SLUDGE TO AGRICULTURAL LAND IN MINNESOTA (FINAL ENVIRONMENTAL STATEMENT),
Agricultural Research Service, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-09265

LIBBY REREGULATING DAM AND LAKE--AT SITE POWER KOOTENAI RIVER, MONTANA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 8C.
W74-09266

MAINTENANCE OF THE NEWARK BAY, HACKENSACK AND PASSAIC RIVERS NAVIGATION PROJECT, NEW JERSEY (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, New York, N.Y.
For primary bibliographic entry see Field 4A.
W74-09267

EL DORADO LAKE, WALNUT RIVER, KANSAS, VOLUME 1, (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W74-09268

NEW MELONES LAKE STANISLAUS RIVER CALIFORNIA: SUPPLEMENTAL DATA ON USE OF CONSERVATION YIELD (SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W74-09269

PORT VERDIGRIS 33, INC., VERDIGRIS RIVER, OKLAHOMA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W74-09270

BEAR CREEK PROJECT, TENNESSEE (FINAL ENVIRONMENTAL STATEMENT).
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 4A.
W74-09271

BUENA VISTA FLOOD PROTECTION PROJECT, BUENA VISTA, VIRGINIA (FINAL ENVIRONMENTAL STATEMENT),.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W74-09272

MAINTENANCE DREDGING AND JETTY REPAIR, HAMPTON HARBOR, NEW HAMPSHIRE (FINAL ENVIRONMENTAL STATEMENT).
Corps of Engineers, Waltham, Mass.
For primary bibliographic entry see Field 4A.
W74-09273

MAINTENANCE DREDGING, CHATHAM (STAG E) HARBOR, MASSACHUSETTS (FINAL ENVIRONMENTAL STATEMENT).
Corps of Engineers, Waltham, Mass.
For primary bibliographic entry see Field 4A.
W74-09274

PRINCIPLES AND STANDARDS FOR PLANNING WATER AND RELATED LAND RESOURCES.
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-09278

PRINCIPLES AND STANDARDS FOR PLANNING WATER AND RELATED LAND RESOURCES (FINAL ENVIRONMENTAL STATEMENT).
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-09279

MONTGOMERY V. ELLIS (ACTION SEEKING TO ENJOIN STREAM CHANNELIZATION).
For primary bibliographic entry see Field 6E.
W74-09299

TO AMEND THE WILD AND SCENIC RIVERS ACT.
For primary bibliographic entry see Field 6E.
W74-09308

PROPOSED WILD AND SCENIC CHATTOOGA RIVER AND THE CONVEYANCE OF CERTAIN PUBLIC LANDS.
For primary bibliographic entry see Field 6E.
W74-09310

ECOLOGICAL CONCEPTS AND APPLICATIONS TO PLANNING,
Michigan State Univ., East Lansing. Dept. of Zoology.
For primary bibliographic entry see Field 6B.
W74-09418

PLANNING FOR AREAS OF SIGNIFICANT ENVIRONMENTAL AND AMENITY VALUE,
California Univ., Berkeley. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 6B.
W74-09420

THE ENVIRONMENTAL IMPACT CONCEPT, AND ITS EFFECT ON THE NATIONAL GAS INDUSTRY,
Southwest Research Inst., San Antonio, Tex.
For primary bibliographic entry see Field 5C.
W74-09489

ENVIRONMENTAL DISRUPTION: IMPLICATIONS FOR ECONOMIC PLANNING,
For primary bibliographic entry see Field 6B.
W74-09564

7. RESOURCES DATA

7B. Data Acquition

LASER RAMAN SPECTROSCOPY OF SOLUTES DISSOLVED IN WATER FROM A REMOTE PLATFORM,
Rhode Island Univ., Kingston. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-09255

SNOW SURVEY AND VEGETATION GROWTH IN HIGH MOUNTAINS (SWISS ALPS),
Zurich Univ. (Switzerland). Geographisches Institut.
For primary bibliographic entry see Field 2C.
W74-09320

SIMPLE METHOD OF MEASURING THE AVERAGE AMOUNT OF WATER PRODUCED ANNUALLY BY MELTING OF ICE ON A GLACIER,
Water Survey of Canada, Ottawa (Ontario).
For primary bibliographic entry see Field 2C.
W74-09343

DISCHARGE COEFFICIENTS OF FLOAT-AREA-TYPE FLOW METERS,
Tokyo Science Univ. (Japan).
For primary bibliographic entry see Field 2E.
W74-09480

UNDERWATER TELEVISION - ITS DEVELOPMENT AND FUTURE,
Hydro Products, San Diego, Calif.
C. L. Strickland.
Underwater Journal Information Bulletin, Vol 5, No 6, p 244-249, December 1973. 9 fig.

Descriptors: *Remote sensing, *Photography, Cameras, *Instrumentation, Exploration, Telemetry.
Identifiers: *Underwater television.

The development and future of underwater television is reviewed. In the past ten years, underwater television systems have evolved from bulky, unreliable studio-type cameras mounted in watertight housings to miniature, highly portable units capable of extending man's vision into the most rugged environments. The reason for this evolution has been the development of cameras designed specifically for use underwater and their acceptance as useful tools for virtually any application where man must extend his visual capability in order to do useful work. This evolution process is continuing towards highly sophisticated underwater television systems designed for specialised work such as offshore drilling in deep water, underwater mining, sewer and pipeline inspection, ship-hull inspection and many others. (Campbell-NWWA)
W74-09545

APPLICATION OF ERTS-1 IMAGERY IN THE VERMONT-NEW YORK DISPUTE OVER POLLUTION OF LAKE CHAMPLAIN,
Vermont Univ., Burlington. Remote Sensing Lab.
For primary bibliographic entry see Field 5B.
W74-09585

AN INTERDISCIPLINARY STUDY OF THE ESTUARINE AND COASTAL OCEANOGRAPHY OF BLOCK ISLAND SOUND AND ADJACENT NEW YORK COASTAL WATERS,
Long Island Univ., Greenvale, N.Y. Science Engineering Research Group.
For primary bibliographic entry see Field 5B.
W74-09602

CALIBRATION OF U.S. GEOLOGICAL SURVEY RAINFALL/RUNOFF MODEL FOR PEAK FLOW SYNTHESIS--NATURAL BASINS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2A.
W74-09603

A GENERAL PURPOSE EVENT WATER-LEVEL RECORDER,
National Water and Soil Conservation Organization, Wellington (New Zealand).
J. E. Patterson.
New Zealand Hydrological Research Progress Report No 14, 1973. 29 p, 18 fig, 2 ref.

Descriptors: *Data collections, *Water measurement, Hydrologic data, Stream gages, Equipment, Peak discharge.
Identifiers: *Event recorders.

A battery-operated water-level recorder developed for general purpose uses may be modified to record events. The recorder is a modified Fischer and Porter series 1542 analog-to-digital water-level recorder. The conversion is partly mechanical and partly electronic. The conversion kit comprises a sensor to detect stage changes, a set of components mounted behind the high-order code disc for producing time pulses and allowing alignment of the code disc with respect to the punches, a stepping motor and gearbox driving the high-order code disc, and an electronic circuit which controls the stepping motor and the punch motor in response to commands from the clock, the sensor and the time switches behind the high-order code disc. (Knapp-USGS)
W74-09604

SNOW SAMPLING TECHNIQUES ON A SMALL SUBALPINE WATERSHED,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 2C.
W74-09608

A COMPARISON OF TECHNIQUES OF SAMPLING THE ARCTIC-SUBARCTIC SNOWPACK IN ALASKA,
Soil Conservation Service, Anchorage, Alaska.
For primary bibliographic entry see Field 2C.
W74-09609

A HYBRID AUTOMATIC ANALYSER,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 5A.
W74-09622

AN ADAPTED DETERMINATION OF PHOSPHATE IN SEAWATER FOR USE WITH THE HYBRID AUTOMATIC ANALYSER,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 5A.
W74-09623

ON THE PRESSURE CHAMBER TECHNIQUE FOR ESTIMATING LEAF WATER POTENTIAL IN SORGHUM,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-09730

TELEMETERED PROFILING ISOTOPIC SNOW GAUGE: FINAL REPORT AND SPECIFICATIONS,
Aerojet Nuclear Co., Idaho Falls, Idaho.
For primary bibliographic entry see Field 2C.
W74-09757

7C. Evaluation, Processing and Publication

SNOW SURVEY AND VEGETATION GROWTH IN HIGH MOUNTAINS (SWISS ALPS),
Zurich Univ. (Switzerland). Geographisches Institut.
For primary bibliographic entry see Field 2C.
W74-09320

GROUND-WATER DATA, 1972, INDIAN WELLS VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
W74-09352

FLOOD PLAIN INFORMATION: OHIO RIVER, BROOKE COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09354

FLOOD PLAIN INFORMATION; POCOTALIGO RIVER-TURKEY CREEK-CANE SAVANNAH CREEK-GREEN SWAMP-SHOT POUCH CREEK-ROCK BLUFF SWAMP, SUMTER COUNTY, SOUTH CAROLINA.
Army Engineer District, Charleston, S.C.
For primary bibliographic entry see Field 4A.
W74-09355

FLOOD PLAIN INFORMATION; WILKESBORO AND NORTH WILKESBORO, NORTH CAROLINA; YADKIN RIVER AND REDDIES RIVER.
Army Engineer District, Charleston, S.C.
For primary bibliographic entry see Field 4A.
W74-09356

FLOOD PLAIN INFORMATION; KIT AND NORTHEAST CREEKS; RESEARCH TRIANGLE AREA, DURHAM AND WAKE COUNTIES, NORTH CAROLINA.
Army Engineer District, Wilmington, N.C.
For primary bibliographic entry see Field 4A.
W74-09357

FLOOD PLAIN INFORMATION; REEDY RIVER, RICHLAND CREEK, GREENVILLE COUNTY, SOUTH CAROLINA.
Army Engineer District, Charleston, S.C.
For primary bibliographic entry see Field 4A.
W74-09358

CALCULATION OF NATURAL CATCHMENT INFILTRATION BY COMPUTER,
National Water and Soil Conservation Organization, Wellington (New Zealand).
A. W. Hurst.
New Zealand Hydrological Research Progress Report No 15, 1973. 24 p, 6 fig, append. Published by Ministry of Works, Wellington, New Zealand.

Descriptors: *Computer programs, *Rainfall-runoff relationships, *Infiltration, Base flow, Hydrograph analysis.
Identifiers: *New Zealand.

Computer programs which analyze rainfall and runoff records to calculate infiltration are described. The programs establish a standard method of calculating infiltration, so that measurements at different places and times can be reasonably compared. The system consists of three programs, which are run in sequence. DISPLAY gives a graphical representation of the rainfall and runoff. From this program the starting and finishing times of storms can be obtained for use in the next program. FLOWINF separates the surface flow from the base flow and interflow components. The program calculates total surface runoff for each storm and total rainfall over the storm period. From these figures, an initial estimate of infiltration rate (which is assumed to be constant for each storm) is made. The values are a first estimate. Unlikely values usually indicate errors in the rainfall or runoff, or a catchment in which the surface flow is not separable from the interflow. TIMECOND calculates an infiltration rate equation by an iterative method. The precipitation is corrected for interception loss, and infiltration, according to an assumed equation, is subtracted. The result is a predicted total surface runoff for each storm. The prediction is compared with the actual surface runoff found by program FLOWINF, and a new infiltration equation is calculated. This is done four times, and by the fourth step the predicted and actual runoff totals will be fairly close if the assumptions in program TIMECOND are justified. (Knapp-USGS)
W74-09367

RECORDING FLOODS AND FLOOD DAMAGE,
Geological Survey, Reston Va.
For primary bibliographic entry see Field 4A.
W74-09397

THE WORTH OF DATA IN HYDROLOGIC DESIGN,
Geological Survey, Washington, D.C.
M. E. Moss, and D. R. Dawdy.
Highway Research Record, No 479, p 46-53, 1973. 3 fig, 1 tab, 11 ref.

Descriptors: *Hydrologic data, *Cost-benefit analysis, *Data collections, *Flood data, Flood forecasting, Highways, Bridges, Roads, Design flood, Simulation analysis, Statistics, Probability, Statistical methods.

Current methodologies for the determination of the worth of hydrologic data are reviewed. The simulation approach requires information concerning the statistical properties of the data that are not usually known. The Bayesian approach often leads to mathematically intractable relations. The two approaches may be combined by defining the data worth through simulation under the condition of assumed statistical properties and releasing the conditioning by making use of the prior distributions of the unknown statistics obtained from the Bayesian approach. This combined approach circumvents the problems encountered when either the Bayesian or the simulation approach is used exclusively. An example illustrates the use of the combined approach in evaluation of the worth of flood data in the design of highway crossings. (See also W74-09390) (Knapp-USGS)
W74-09399

HYDROLOGIC DATA STORAGE AND RETRIEVAL SYSTEM,
Nevada Univ., Reno. Center for Water Resources Research.
H. N. Friesen.
Available from NTIS, Springfield, Va. 22151 as NVO-1253-2 Price $3.00 printed copy; $1.45 microfiche. User Information Bulletin 1, June 1972. 17 p, 6 fig, 3 tab. AEC Contract AT (29-2)-1253.

Descriptors: *Data storage and retrieval, *Hydrologic data, Data processing, *Information exchange, Statistical methods, *Data collection.

Hydrologic data collected from various Atomic Energy Commission test sites is stored and retrieved in a computerized system as an aid to geologic and hydraulic investigations. The system was designed with emphasis on ease of user retrieval. A diversified set of statistical routines is included in the system to provide the user with a wide choice of post-retrieval data manipulation. (Knapp-USGS)
W74-09401

AN OBJECTIVE WATER QUALITY INDEX,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
For primary bibliographic entry see Field 5G.
W74-09436

CONTINUOUS SIMULATION MODELS IN URBAN HYDROLOGY,
Organization Stanford Univ., Calif.
For primary bibliographic entry see Field 3D.
W74-09479

COMPUTER DATA FLOWS SMOOTHLY FOR SMALL WATER AUTHORITY,
Monroeville Water Authority, Pa.
For primary bibliographic entry see Field 6C.
W74-09483

PITFALLS IN PARAMETER ESTIMATION FOR OXYGEN TRANSFER DATA,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 5A.
W74-09514

(WATER WELL CONTRACTOR SURVEY).
Water Supply Management, Barrington, Ill.
For primary bibliographic entry see Field 4B.
W74-09529

SIMULATION CRITERIA FOR SELECTING WATER RESOURCE SYSTEM ALTERNATIVES,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 6A.
W74-09567

A GENERAL PURPOSE SIMULATION MODEL FOR ANALYSIS OF SURFACE WATER ALLOCATION USING LARGE TIME INCREMENTS,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 6A.
W74-09568

AN OCEANOGRAPHIC OBSERVATION OF NEW YORK BIGHT FROM ERTS-1,
Atlantic Oceanographic and Meteorological Lab., Miami, Fla. Physical Oceanography Lab.
For primary bibliographic entry see Field 5B.
W74-09589

DESKTOP COMPUTER FLOW ROUTING,
Geological Survey, Bay St. Louis, Miss.
For primary bibliographic entry see Field 8B.
W74-09626

MULTIPLE LINEARIZATION FLOW ROUTING MODEL,
Geological Survey, Bay St. Louis, Miss.
For primary bibliographic entry see Field 8B.
W74-09627

GEOHYDROLOGY OF CROW CREEK AND LOWER BRULE INDIAN RESERVATIONS, SOUTH DAKOTA,
Geological Survey, Washington, D.C.
L. W. Howells.
For sale by USGS, Washington, D.C. 20244 Price, $1.25 per set. Hydrologic Investigations Atlas HA-499, 1974. 1 sheet, 10 fig, 4 tab, 4 ref.

Descriptors: *Hydrogeology, *South Dakota, *Indian reservations, Missouri River, Water supply, Reservoirs, Water quality, Water yield, Aquifer, Groundwater.
Identifiers: Crow Creek Indian Reservation(So Dak), Lower Brule Indian Reservation(So Dak).

Shallow groundwater is not obtainable in much of the Crow Creek and Lower Brule Indian Reservations of South Dqkota, and where it is found, it often is of poor quality. Surface water, with the exception of the Missouri River reservoirs, though a valuable and widely distributed resource, is undependable because of scanty and erratic precipitation. Therefore, some people have drilled

deep artesian wells for their basic water needs. Because of the expense of drilling artesian wells, most people will continue to use surface water and shallow groundwater, as available, particularly for livestock supplies. The best chemical quality and largest volume supply of water available within the reservations is from the Missouri River reservoirs. However, financial cost of such development probably will restrict it to large projects or to individual users within a mile or so of the reservoirs; in general, the greater the distance from the reservoir, the higher the cost and the larger the area that probably should be developed. Surface runoff is widely developed for livestock supplies. Although evaporation losses are high, as much as 38 inches a year, dams and dugouts are a comparatively inexpensive way to hold snowmelt and storm runoff for later use at widely dispersed sites. Shallow ground water of fairly good quality is available in only a few areas. In most of these areas well yields will be less than 20 gpm, although two areas will support well yields greater than 50 gpm. (Knapp-USGS)
W74-09638

URBANIZED AREAS SERVED BY SEWERS AND SEPTIC TANKS IN THE SEATTLE-TACOMA URBAN COMPLEX AND ADJACENT AREAS, WASHINGTON,
Geological Survey, Tacoma, Wash.
G. G. Parker, Jr.
Basic Data Contribution No 4 (open-file report), 1974. 1 map, 10 ref.

Descriptors: *Septic tanks, *Maps, *Washington, Cities, Urbanization, Waste water disposal, Waste disposal, Sewers.
Identifiers: *Seattle(Wash), *Tacoma(Wash).

Data areas in Seattle and Tacoma, Washington served by sanitary sewerage systems are shown on a map. The approximate suburban areas where buildings are individually served by septic tanks are also shown. In the Seattle-Tacoma urban complex the largest single sewage-treatment system is that of Metro (Municipality of Metropolitan Seattle) which in 1971 processed almost 57 billion gallons of waste water from an estimated population of about 900,000. Another large sewage-treatment system is operated by the city of Tacoma which in 1971 processed about 18 billion gallons of waste water from an estimated population of about 200,000. More than half the treated waste water in the study area is discharged directly into Puget Sound through submarine outfalls. (Knapp-USGS)
W74-09639

PUBLIC WATER SUPPLIES IN THE SEATTLE-TACOMA URBAN COMPLEX AND ADJACENT AREAS, WASHINGTON,
Geological Survey, Tacoma, Wash.
G. G. Parker, Jr.
Basic Data Contribution No 3 (open-file report), 1974. 1 map, 12 ref.

Descriptors: *Water utilization, *Water supply, *Cities, *Washington, Urbanization, Water works, Utilities, Water distribution(Applied).
Identifiers: Seattle(Wash), Tacoma(Wash).

Areas in Seattle and Tacoma, Washington which are served by public water-supply systems are shown on a map. In 1973 King County had 76 Class I (more than 100 services) water-supply systems, and at least 783 Class II (less than 100 services) systems. Pierce County had 41 Class I and 275 Class II water-supply systems, Snohomish County had 45 Class I and 182 Class II systems, and Thurston County had 11 Class I and 130 Class II systems. In 1970 about 1,720,000 people used water from public-supply systems within the study area. This was almost 94 percent of the total population in the study area. About 82 percent of the public water supplies in the study area came from streams and lakes rather than from springs and wells. The use of publicly supplied water in the study area was almost unchanged between 1965 and 1970, while such use in the State as a whole increased by about 8 percent. (Knapp-USGS)
W74-09640

COMPUTER MODELING APPLICATIONS IN URBAN WATER PLANNING,
Denver Board of Water Commissioners, Colo.
For primary bibliographic entry see Field 6A.
W74-09654

STOCHASTIC ANALYSIS OF ORTHOKINETIC FLOCCULATION,
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 5D.
W74-09719

ERTS-1 VIRGIN ISLANDS EXPERIMENT 589--DETERMINE BOUNDARIES OF ERTS AND AIRCRAFT DATA WITHIN WHICH USEFUL WATER QUALITY INFORMATION CAN BE OBTAINED,
Grumman Ecosystems Corp., Bethpage, N.Y.
For primary bibliographic entry see Field 5A.
W74-09756

8. ENGINEERING WORKS

8A. Structures

BEACH EROSION CONTROL STUDY ON MANATEE COUNTY, FLORIDA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 4A.
W74-09264

MAINTENANCE OF THE NEWARK BAY, HACKENSACK AND PASSAIC RIVERS NAVIGATION PROJECT, NEW JERSEY (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, New York, N.Y.
For primary bibliographic entry see Field 4A.
W74-09267

EL DORADO LAKE, WALNUT RIVER, KANSAS, VOLUME 1, (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W74-09268

NEW MELONES LAKE STANISLAUS RIVER, CALIFORNIA: SUPPLEMENTAL DATA ON USE OF CONSERVATION YIELD (SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W74-09269

PORT VERDIGRIS 33, INC., VERDIGRIS RIVER, OKLAHOMA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W74-09270

BEAR CREEK PROJECT, TENNESSEE (FINAL ENVIRONMENTAL STATEMENT).
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 4A.
W74-09271

MAINTENANCE DREDGING AND JETTY REPAIR, HAMPTON HARBOR, NEW HAMPSHIRE (FINAL ENVIRONMENTAL STATEMENT).
Corps of Engineers, Waltham, Mass.
For primary bibliographic entry see Field 4A.
W74-09273

MAINTENANCE DREDGING, CHATHAM (STAG E) HARBOR, MASSACHUSETTS (FINAL ENVIRONMENTAL STATEMENT).
Corps of Engineers, Waltham, Mass.
For primary bibliographic entry see Field 4A.
W74-09274

SEISMIC PROFILES, COOPER RIVER.
For primary bibliographic entry see Field 2L.
W74-09388

HIGHWAYS AND THE CATASTROPHIC FLOODS OF 1972.
Highway Research Board, Washington, D.C.
For primary bibliographic entry see Field 2E.
W74-09390

DESIGN CRITERIA AND RESEARCH NEEDS,
Hydrologic Engineering Center, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-09400

THE EFFECT OF PROPOSED DEEPENING OF THE JOHN F. BALDWIN AND STOCKTON SHIP CHANNELS ON SALT-WATER INTRUSION, SUISUN BAY AND SACRAMENTO-SAN JOAQUIN DELTA AREAS, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W74-09408

FLOW SMOOTHING IN SANITARY SEWERS,
Environmental Protection Agency, Springfield, Ill.
For primary bibliographic entry see Field 5D.
W74-09471

DISCHARGE RELATIONS FOR SUBMERGED WEIRS,
R. S. Varshney, and S. K. Mohanty.
Indian Journal of Power, Vol 23, No 7, p 225-228, July, 1973. 3 fig, 9 ref.

Descriptors: Engineering structures, Hydraulics, *Weirs, *Overflow, Flow, Mathematical studies, *Mathematical models, *Floods, Municipal wastes.
Identifiers: *Submerged flow.

Mathematical formulae are presented for submerged flow over sharp-crested and broad-crested weirs during floods based on experimental studies. Dimensional analysis shows that the flow over a weir in submerged condition is mainly governed by three dimensional parameters: Froude Number, P/H1, and H2/H1. P stands for the height of weir from the river bed; H1 and H2 are depths of water over weir crest upstream and downstream, respectively. The effect of P/H1 can be eliminated by suitably choosing the ratio P/H1 such that the approach depth does not affect the coefficient of discharge. Thus it is the ratio H2/H1 which mainly governs the submerged flow phenomenon. A correlation between this ratio and the discharge ratio was used to establish the mathematical relationship. The different types of weirs were broadly divided into the sharp-crested and broad-crested weirs, and two mathematical relations were suggested for evaluating stream flow in practical cases. The simplifying assumptions made may involve slight errors, but these are of no major significance to the field engineers. Therefore, the equations can be adopted in practical cases. (Merritt-FIRL)
W74-09481

CHECKING THE SIZE OF SEWERAGE INFILTRATION AND LEAKS OCCURRING UNDER OPERATING CONDITIONS, (VERIFICAREA MARIMII INFILTRATIILOR SI EXFILTRATILOR DIN CANALIZARI IN TIMPUL EXPLOATARII),
For primary bibliographic entry see Field 5D.
W74-09493

BETTER STORM DRAINAGE FACILITIES--AT LOWER COST,
For primary bibliographic entry see Field 5D.
W74-09513

BEYOND 'CITY WATER': RURAL WATER SYSTEM DESIGN,
Conset, Inc., Washington, D.C. National Demonstration Water Project.
For primary bibliographic entry see Field 6B.
W74-09538

VARIABLES AFFECTING WELL SUCCESS IN A KENTUCKY LIMESTONE AQUIFER,
Kentucky Univ., Lexington. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-09543

TWO TESTS FOR THE CLUSTER WELL CONCEPT,
Conset, Inc., Washington, D.C. National Demonstration Water Project.
E. L. Cobb.
Water Well Journal, Vol 28, No 2, p 16-18, 23, February 1974. 2 fig, 1 tab.

Descriptors: *Wells, *Shallow wells, Water supply, Community development, Pipelines, Rural areas, Economics, *South Carolina, *Virginia.
Identifiers: *Cluster-well concept, Community water supply, Rural water supply.

The success of the cluster-well concept as developed by NDWP is tested in the Jasper County, South Carolina and Roanoke projects. Data show that high capacity wells developed to serve a larger number of sparsely distributed families is often uneconomical. In these areas, the distance between homes is often so great that the cost of pipe becomes the prohibiting factor. In such areas, the cluster-well concept of drilling and developing low capacity one- and two-family wells is often the most economical procedure. Although the cluster-well system is frequently less expensive than alternative methods, it is suggested that each project examine its own circumstances in detail, with cost being the chief factor under consideration. (Martino-NWWA)
W74-09549

FLOOD RUNOFF SYSTEMS WITH COLLECTOR CHANNEL AND FAST DISCHARGE FOR DAMS (VOLGYZAROGATAK GYUJTOCSATORNAS, SURRANTOS ARAPASZTOI),
G. Szakatsits.
Vizugyi Kozlemenyek, No 3, p 342-350, 1973.

Descriptors: Engineering structures, *Weirs, Dams, *Storm runoff, *Model studies, Channels, Channel improvement, Flood control.
Identifiers: *Collector channels.

Hydrologic, hydraulic, and engineering aspects of collector channels designed to collect, guide, and attenuate the runoff from runoff weirs to fast discharge facilities in dams were studied. Free overflow at maximum water yield, minimum possible dimensions of the collector channel, and hydraulically smooth, attenuated flow in the collector channel are the principal requirements of overflow-collector channel systems. Model studies of different configurations and designs of overflows, collector channels, and fast discharge facilities revealed the superiority of the conventional lateral overflow design to all other systems, and the positive economical and hydraulic advantages of trapezoid profiles for collector channels. The broadening of the collector channel does not give noteworthy additional advantages. Also, existing collector channels were found to be unnecessarily overdimensioned regarding channel depth. (Takacs-FIRL)
W74-09720

APPARATUS FOR RELEASING CHEMICALS CLEARING AND CLEANING WASTE PIPES,
For primary bibliographic entry see Field 5D.
W74-09725

INSTALLATION OF LARGE-DIAMETER FIBER-GLASS FLEXIBLE PIPE IN MUNICIPAL SYSTEMS,
Johns-Manville Corp., Denver, Colo.
R. M. Hutchison.
Journal of the American Water Works Association, Vol 65, No 12, p 791-793, December, 1973. 8 fig, 2 ref.

Descriptors: Engineering structures, Pipes, *Joints(Connections), *Linings, Municipal water.
Identifiers: *Fiber-glass pipes, Flexible pipes, Fillers, Gaskets.

Installation considerations for fiber-glass pipe are discussed with special emphasis on the value of proper installation and handling practices for flexible pipes. The soil surrounding the pipes must be capable of being compressed to a density of greater than or equal to 85 percent standard proctor, or be that dense in its natural state. A maximum 3/4 inch diameter crushed rock is ideal for backfill and bedding material. Installation can be evaluated by measuring the initial deflection with full load on the pipe. The anticipated ring deflection caused by axial bending, plus ring deflection induced by soil load, can be calculated. Initial deflection should not exceed 5.0 percent and long-term, full-load deflection should not exceed 7.5 percent. In municipal systems elastomeric gaskets (bell and spigot) are the preferable joint. Compression of the gasket should be present in the full offset opposition plus a minimum 5.0 percent initial deflection. Resin-rich inner surfaces with and without aggregate type fillers and thermoplastic liners are in use in pipes serving municipal markets. A major benefit to the utility is chemical and abrasion resistance. (Merritt-FIRL)
W74-09727

VACUUM SEWAGE CONVEYING WITH VACUUM OPERATED VALVE,
For primary bibliographic entry see Field 5D.
W74-09731

REALIZATION OF THE DANUBE FLOOD PROTECTION PROJECT FOR VIENNA (DAS WERDEN DES PROJEKTES FUER DEN DONAUHOCHWASSERSCHUTZ VON WIEN),
For primary bibliographic entry see Field 4A.
W74-09739

8B. Hydraulics

WAVE ACTION AND BREAKWATER LOCATION HARBOR OF REFUGE FOR LIGHT-DRAFT VESSELS, BARCELONA, NEW YORK,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. A. Jackson, R. Y. Hudson, and J. G. Housley.
Available from the National Technical Information Service, Springfield Va. 22151 as AD-760 938. Technical Report No 2-523 September 1959. 42 p, 4 tab, 31 photo.

Descriptors: *Administrative agencies, *New York, *Harbors, *Model studies, *Breakwaters, Protection, Retaining walls, Public benefits, Structures, Hydraulic structures, Engineering structures, Ocean waves, Navigable waters, Federal government, Public access, Standards, Design, Design criteria, Waves, Turbulence, Flood waves.

A wave action and breakwater location harbor of refuge for light-draft vessels located in and around Barcelona, New York is contemplated. The tests were conducted through the construction of a hydraulic model, to determine whether the proposed breakwaters were adequate to protect the enclosed mooring basin from storm waves. If they were not adequate, a determination of the modifications necessary to provide protection at minimum cost was the next priority. It was concluded from the test results that a simple arrowhead-type breakwater system, similar to the one already proposed, will provide adequate protection from storm waves for all small craft properly anchored in a designated mooring area. Because of the arrowhead design the construction of the breakwater will not significantly affect the wave height or intensity at the harbor entrance. Logistics and specifications of the proposed breakwater system are included. (Silber-Florida)
W74-09259

OBSERVATIONS ON THE CAUSES OF BRIDGE DAMAGE IN PENNSYLVANIA AND NEW YORK DUE TO HURRICANE AGNES,
Federal Highway Administration, Washington, D.C. Office of Engineering and Traffic Operations.
For primary bibliographic entry see Field 2E.
W74-09396

THE WORTH OF DATA IN HYDROLOGIC DESIGN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-09399

DISCHARGE RELATIONS FOR SUBMERGED WEIRS,
For primary bibliographic entry see Field 8A.
W74-09481

EXPERIMENTAL FIELD STUDIES REQUIRED FOR THE DESIGN OF DRAINAGES, (STUDII EXPERIMENTALE IN TEREN, NECESARE PROIECTARII DRENAJELOR),
For primary bibliographic entry see Field 4A.
W74-09495

OPERATION AND MAINTENANCE OF WELLS,
Stamm-Scheele, Inc., Rayne, La.
For primary bibliographic entry see Field 8G.
W74-09524

WATER WELL DESIGN FOR EARTHQUAKE INDUCED MOTIONS,
Bechtel Power Corp., Los Angeles, Calif.
H. N. Nazarian.
Journal of the Power Division, American Society of Civil Engineers, Vol 99, No P02, p 377-393, November 1973. 7 fig, 3 tab, 12 ref, 2 append.

Descriptors: Wells, *Water wells, *Seismic design, *Design, Engineering structures, Structural analysis, Soil dynamics, *Earthquakes, Seismic waves, *Stress.
Identifiers: Free-field deformation(Soil), Shear modulus, Modulus of elasticity, Safe shutdown earthquake.

A practical method of analysis for the seismic design of water wells is presented. The computational steps required for the casing analysis are based mainly on the effects of the free-field soil deformations due to seismic waves. Since maximum compressional and shear waves do not occur

simultaneously, results based on this method will mostly indicate an upper-bound stress condition. However, the method, with its shortcomings, will provide a simplified solution to an otherwise complex problem. By further refinements of the input parameters, it is possible to reduce the stress levels appreciably. Further research may be conducted in: (1) The areas of soil deformation above bedrock; (2) Phasing of waves with different wavelengths and incidence angles; (3) Definition of critical wavelength; and (4) Improved prediction of future earthquakes for a particular site. Although the discharge system is analyzed by dynamic theories, the resultant unusual mode shapes, effects of submerged portions, and maintenance requirements make the analysis a unique dynamics problem. (Campbell-NWWA)
W74-09535

AN EXPERIMENTAL STUDY OF DRAINAGE BASIN EVOLUTION AND THE INFLUENCE OF LANDFORMS ON HYDROLOGIC VARIABLES,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
For primary bibliographic entry see Field 4A.
W74-09586

INFLUENCE OF SUCTION AND BLOWING ON ENTRAINMENT OF SAND PARTICLES,
Waterloopkundig Laboratorium, Delft (Netherlands).
For primary bibliographic entry see Field 2J.
W74-09616

STOCHASTIC ANALYSIS OF DUNE BED PROFILES,
Harza Engineering Co., Chicago, Ill. Water Resources Planning Div.
For primary bibliographic entry see Field 2J.
W74-09619

COMPARISON OF FOUR NUMERICAL METHODS FOR FLOOD ROUTING,
Hydraulics Research Station, Wallingford, (England).
For primary bibliographic entry see Field 2E.
W74-09621

DESKTOP COMPUTER FLOW ROUTING,
Geological Survey, Bay St. Louis, Miss.
T. N. Keefer.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY7, Paper 10669, p1047-1058, July 1974. 8 fig, 4 ref, 2 append.

Descriptors: *Routing, *Flood routing, Open channel flow, Mathematical studies, Systems analysis, Flood waves, Digital computers, Computer programs.

Flood routing by a minimum storage convolution scheme is presented so that the diffusion analogy or Harley routing models may be applied with desktop computers. The technique reduces the required storage for matrix convolution to 2n, in which n is the number of response function ordinates. An extension of the technique may be used for multiple linearization routing. (Knapp-USGS)
W74-09626

MULTIPLE LINEARIZATION FLOW ROUTING MODEL,
Geological Survey, Bay St. Louis, Miss.
T. N. Keefer, and R. S. McQuivey.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY7, Paper 10668, p 1031-1046, July 1974. 12 fig, 2 tab, 12 ref, 2 append.

Descriptors: *Routing, *Flood routing, Open channel flow, Mathematical studies, Systems analysis, Flood waves, Digital computers, Computer programs.
Identifiers: Multiple linearization.

For flow routing, multiple linearization is a convolution technique which allows variations in wave celerity and damping with discharge. By treating the input to a routing reach as a set of inputs to several subsystems, rather than as a single system, from 10%-50% gains in root mean square accuracy can be obtained when routing hourly discharge values. Significant visual improvement in the arrival time of low flows is achieved. Little gain in accuracy is possible when routing daily discharges unless 2 day or 3 day differences in arrival time occur. (Knapp-USGS)
W74-09627

SIMULATION ACCURACIES OF GRADUALLY VARIED FLOW,
Montreal Engineering Co. Co. Ltd. (Quebec).
J. P. Jolly, and V. Yevjevich.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY7, Paper 10677, p 1011-1030, July 1974. 14 fig, 2 tab, 12 ref, 2 append.

Descriptors: *Simulation analysis, *Numerical analysis, *Gradually varied flow, Open channel flow, Mathematical models, Hydraulic models, Unsteady flow.

Two types of errors which occur in the numerical simulation of gradually varied, unsteady open-channel flows are errors resulting from the choice of the momentum equation and errors resulting from the degree of numerical sophistication of integration techniques used in solving the governing equations by the specified intervals scheme of the method of characteristics. Three different momentum equations cited in the literature give identical results when the velocity distribution is uniform. When this distribution is not uniform, each equation gives somewhat different flow depths for similar initial and boundary conditions of gradually varied, unsteady flow. An increase in complexity of the integration technique increases the accuracy of simulation. To determine the absolute values of accuracy of a technique, accurate flow measuring devices and corresponding experiments are needed for comparison between the results of numerical and physical simulations. (Knapp-USGS)
W74-09628

OPTIMAL DESIGN FOR HIGHWAY DRAINAGE CULVERTS,
Meta Systems, Inc., Springfield, Va.
For primary bibliographic entry see Field 4A.
W74-09630

VARIATION IN WIDTH-DISCHARGE RELATION AND SOME IMPLICATIONS FOR HYDRAULIC GEOMETRY,
Sheffield Univ. (England). Dept. of Geography.
D. Knighton.
Geological Society of America Bulletin, Vol 85, No 7, p 1069-1076, July 1974. 6 fig, 3 tab, 18 ref.

Descriptors: *Sediment transport, *Braiding, *Meanders, *Channel morphology, Geomorphology, Scour, Channel erosion, Bank erosion, Regime.

The downstream change in width in a channel with cohesive banks and no marked downstream variation in bank erodibility is principally a function of discharge, while rate of change at a cross section is largely controlled by bank material composition, particularly silt-clay content. Hydraulic geometry is thereby constrained. The deposition of noncohesive sediment in the form of point bars and central islands provides the means whereby the stream can increase its rate of change of width at a cross section, suggesting that meandering and braided reaches can be distinguished from straight reaches in terms of hydraulics. The effect of this adjustment is to decrease the mean velocity range. (Knapp-USGS)
W74-09632

OPTIMAL CONTROL OF FLOW IN COMBINED SEWER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-09652

HYDRAULICS OF A WATER SUPPLY SYSTEM WITH FLUCTUATING WATER DEMAND, (HYDRAULIK EINES WASSERVERSORGUNGSSYSTEMS MIT FLUKTUIERENDEN BEDARFSMENGEN),
Karlsruhe Univ. (West Germany). Institut fuer Siedlungswasserwirtschaft.
R. G. Cembrowicz.
Angewandte Informatik, No 11, p 481-488, 1973. 8 ref. (English summary).

Descriptors: *Algorithms, Mathematical studies, *Model studies, *Systems analysis, Sewer systems, Engineering structures, Pipes, Water supply, *Water demand.

An algorithm has been developed using systems analysis techniques for the hydraulic dimensioning of a water supply system with counterpressure tank for fluctuating water demand. The pump characteristics and the water-level fluctuations in the tanks are taken into account in the model. The dimensions of the system components are given by the hydraulic equilibrium conditions as a function of parameters defined as pressure heads and pressure differences. The reference pressure of the pump stand, and the pressure head occurring at the feed-in point of the municipal network in the main pipe during the peak demand interval were found to be sensitive principal parameters of the water supply in sensitivity tests of the system for different fluctuations in the water demand. The hydraulic equilibrium in the tanks can be fully restored by adequate reduction of the pressure head during drops in the water demand. (Takacs-FIRL)
W74-09726

ENGINEERING AND CONSTRUCTION PRACTICES FOR GRAY AND DUCTILE CAST-IRON PIPE,
Cast Iron Pipe Research Association, Oak Brook, Ill.
W. H. Smith.
Journal of the American Water Works Association, Vol 65, No 12, p 788-791, December, 1973. 2 fig, 2 ref.

Descriptors: Engineering structures, Pipes, *Water hammer, *Casings, *Metal pipes, Corrosion.
Identifiers: *Cast iron pipes, Superloads, *Joints(Connections).

Gray cast iron pipe and ductile cast iron pipe were designed using realistic assumptions for earth load, trench support, superloads, impact internal pressure, and water hammer or surge. A wide range of joints is available for both pipe materials, from flanged joints, which are ideal for plant and pump station installations, to standard mechanical and push-on joints, which are reliable in allowing reasonable deflections, and subaqueous pipe joints, which allow for extreme deflection. Restrained joints resist thrust due to internal pressure. Corrosion resistance of ductile cast iron pipe is somewhat better than that of gray cast iron pipe, and only a small percentage of the soils in the United States is corrosive to either. Proven, inexpensive corrosion prevention can be accomplished

in any severely corrosive soils using loose polyethylene encasement. (Merritt-FIRL)
W74-09728

SOME LESSONS FROM MODEL AND FULL-SCALE TESTS IN RECTANGULAR SEDIMENTATION TANKS,
Imperial Chemical Industries Ltd., Runcorn (England). Mond Div.
For primary bibliographic entry see Field 5D.
W74-09736

8C. Hydraulic Machinery

LIBBY REREGULATING DAM AND LAKE--AT SITE POWER KOOTENAI RIVER, MONTANA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Seattle, Wash.
Available from the National Technical Information Service, Springfield, Va., 22151, as EIS-MT-73-1228-F, $5.25 in paper copy. July 12, 1973. 64 p, 5 map.

Descriptors: *Dams, *Electric power production, *Project planning, *Power system operation, *Environmental effects, Spillways, Dam construction, Transmission(Electrical), *Montana, Cost-benefit ratio, Electric power demand, Federal government, Excavation, Backfill, Road construction.
Identifiers: *Environmental Impact Statements.

Discussed are the effects of adding at-site power generating facilities to the reregulating dam on the Kootenai River, Montana. The reregulating dam was authorized as part of the main Libby Dam project and as at-site generation was not included with the initial Congressional authorization, seperate authorization is required. At-site power would consist of four units capable of producing 30,600 kilowatts of firm power. The incremental benefit-to-cost ratio is 1.8 to 1. The addition of on-site power would have no effect on relocations beyond that already required for construction of the reregulating dam, except for the construction of an additional access road of approximately 1,000 feet. The excavation for this construction would result in less fill needed for the dam and might provide a beneficial effect by reducing the use of the spillway thereby decreasing the occurrence of nitrogen supersaturation downstream of the project. The only possible adverse effects might result from the transmission facilities that must be built to provide integration from the dam to the Bonneville Power Administration's system and will depend on the method of integration selected. The only alternative would be having no power generating facilities. (Sutton-Florida)
W74-09266

ALUMINUM PIT DOORS PROVIDE EASY ACCESS TO A RETENTION BASIN.
For primary bibliographic entry see Field 5D.
W74-09515

'PIG' BRINGS BACK CAPACITY,
Denver Water Dept., Colo.
H. H. Glasson.
Water Wastes Engineering, Vol 10, No 11, p 33-35, November, 1973.

Descriptors: *Colorado, Reservoirs, *Conduits, *Maintenance, Clays, Colloids, *Water supply, Water treatment.
Identifiers: *Denver(Colo), Ralston Reservoir(Colo), *Cleaning.

Two raw water conduits supplying Denver's water supply were cleaned using a device called a pig and designed by the utility's maintenance personnel. Ralston Reservoir has a storage capacity of 11,252 acre-ft and supplies raw water and through two cylinder-type reinforced concrete pipelines to the treatment plant. There was a substantial buildup of colloidal clay on the inner surface of the pipe, ranging in thickness from approximately 1/16th to 3/8th inch through most of the 8.7 miles. A two section, eight-bladed mechanical cleaner was designed and coupled to the plug or pig type cleaner like a trailer. A flexible coupling designed to allow for flexibility through the bends in the conduit attached this assembly to the pig. Operational capacity after cleaning increased from less than 52 mgd to over 67 mgd. New operational criteria based on reevaluation of design capabilities were established. (Merritt-FIRL)
W74-09516

HOW TRIPLE SIPHON SOLVED SEWAGE TRANSFER ACROSS WELLAND RIVER,
For primary bibliographic entry see Field 5D.
W74-09517

O AND M COSTS: PAY NOW OR PAY LATER,
National Water Well Association, Houston, Tex. Research Facility.
For primary bibliographic entry see Field 4B.
W74-09533

CHURCHILL FALLS--THE COSTS AND BENEFITS OF A HYDRO-ELECTRIC DEVELOPMENT PROJECT,
Macquarie Univ., North Ryde (Australia).
For primary bibliographic entry see Field 6B.
W74-09562

LINER INSERTING MACHINE FOR PIPELINES,
R. R. Reed.
U.S. Patent 3,774,286. Official Gazette of the United States Patent Office, Vol 916, No 4, p 1229, November 27, 1973.

Descriptors: Sewers, *Pipes, *Linings, Irrigation, *Patents, Equipment.
Identifiers: *Liner-inserting machine, Apparatus.

A liner-inserting machine for underground pipelines used in irrigation or sewer systems is described. Liner pipe sections are thrust into the pipeline by the patented machine. The machine includes a frame in an excavation adjacent to the open end of the pipeline. The frame supports a power actuated, reciprocable pusher head in axial alignment with the open end of the pipe. It forcefully thrusts the liner pipe sections in end-coupled relation into the existing pipeline. (Merritt-FIRL)
W74-09722

PRIMING UNIT FOR DISTRIBUTING PRIMING WATER TO MULTIPLE SEWER LINE WATER TRAPS,
Precision Plumbing Products, Inc., Portland, Oreg. (Assignee).
For primary bibliographic entry see Field 5D.
W74-09732

DELAYS IN THE OPERATION OF SUBSURFACE DRAINAGE TRENCHING MACHINES,
Quebec Ministere de l'Agriculture et de la Colonisation, Buckingham.
S. D. Fisk, R. S. Broughton, and E. R. Norris.
Canadian Agricultural Engineering, Vol 14, No 2, p 69-71, December, 1972. 1 fig, 2 tab, 3 ref.

Descriptors: *Drainage, *Trenches, *Construction, Subsurface drainage, Tile drainage, Installation, Drainage systems, Drainage engineering.

Observations of four, wheel-type, subsurface drainage trenching machines showed that delays accounted for 53.3-65.9 percent of total working-day time. The delays that appear to be most easily reduced include setting targets (5.7 percent time loss), making junctions (3.8 percent time loss), and moving to new job sites (3.7 percent time loss). Based on 174 available working days, the average effective digging time was an equivalent of only 72 days. By decreasing these time losses, the operational efficiency of subdrainage trenching can be improved and considerable savings can be made. (Skogerboe-Colorado State)
W74-09794

8D. Soil Mechanics

RAYSTOWN LAKE--RAYSTOWN BRANCH JUNIATA RIVER, PENNSYLVANIA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Baltimore, Md.
Available from the National Technical Information Service, Springfield, Va. 22151 as EIS-PA-73-1293-F, $9.25 in paper copy. March 1973. 81 p, 19 tab, 4 fig, 15 photo, 18 append.

Descriptors: *Water resources development, *Water resources, *River basins, *Flood protection, *Flood control, Dams, Spillways, Environmental effects, *Pennsylvania, Inter-agency cooperation, Decision making, Federal project policy, Project purposes, Project planning, Recreation.
Identifiers: *Environmental Impact Statements, Huntingdon Co.(Pa.), *Raystown Lake (Pa.).

A flood protection project includes construction of a rock and earthfill dam, a dike, service bridges, concrete spillways, housing facilities, access roads, and recreation facilities. Purposes of the project are flood control, fish and wildlife preservation and recreational benefits. Land utilization downstream will be increased through construction of dams. Controlled discharges should result in improved fishing and recreational diversity will be greatly increased. The economy of the whole area surrounding the project should be enhanced and the lands will be protected and preserved consistent with both aesthetic and biological values. Adverse environmental effects will include relocating about 1,320 residences and an initial loss in the tax base of Huntingdon County. The recreation pool will permanently inundate 8,300 acres of land eliminating the habitat for all associated terrestrial biota, along with certain stream dwelling aquatic biota. Periodically, the flood pool will inundate an additional 2,500 acres which will adversely affect the biota in the flooded areas. Alternatives included other sites alone and in conjunction with local flood protection measures, dams with provisions for hydroelectric power, flood plain zoning, flood insurance, evacuation and total abandonment. (Sutton-Florida)
W74-09262

BUENA VISTA FLOOD PROTECTION PROJECT, BUENA VISTA, VIRGINIA (FINAL ENVIRONMENTAL STATEMENT),.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W74-09272

DEPTH PREDICTION FOR EARTH-PENETRATING PROJECTILES,
Sandia Labs., Albuquerque, N. Mex. Terradynamics Div.
C. W. Young.
Journal of the Soil Mechanics and Foundations Division, American Society of Civil Engineers, p 803-817, May 1969. 2 fig, 3 tab, 7 ref, 4 append.

Descriptors: *Penetration, *Soil mechanics, Depth, Rock mechanics, Forecasting.
Identifiers: *Projectiles, *Depth prediction, Impact.

An empirical equation is developed for the prediction of total penetration distance of a projectile in many natural earth targets. Development of this

equation was based on approximately 160 full-scale penetration tests into a variety of targets, including rock, gypsite, permafrost, ice, desert alluvium, silt, sand, and saturated clay. The parameters considered in the development (other than target materials) were (1) projectile weights from 222 to 5,750 lb., (2) projectile diameters from 3.1 to 18 in., (3) impact velocities from 78 to 1,077 fps, and (4) 11 projectile nose shapes. The equation fits 91% of the data within 20% and fits 98.5% of the data within 25%. The necessary tables of nose-performance coefficients and soil constants are presented for practical engineering usage. (Staplin-NWWA)
W74-09534

8E. Rock Mechanics and Geology

FATIGUE BEHAVIOR OF ROCK,
Durham Univ. N.C.
P. B. Attewell, and I. W. Farmer.
International Journal of Rock Mechanics and Mining Science, Vol 10, No 1, January, 1973, p 1-9.

Descriptors: *Fatigue(Mechanics), *Failure(Mechanics), *Rock mechanics, Structural behavior, Cracks, Stress, Strain, *Dolomite.
Identifiers: Strain energy-dependent crack propogation.

The mechanism of fatigue in rocks has never been satisfactorily described. Results are reported of a number of fatigue tests on dolomite specimens, and a hypothesis is proposed to explain the resultant deformation based on a description of rock failure in terms of strain energy-dependent crack propagation. The basic argument is that above a stress level at which cracks are initiated, deformation from successive subfailure load cycles will be cumulative, and failure will occur when the strain energy stored in the specimen exceeds a critical energy level equivalent to failure under noncyclic loading. (Martino-NWWA)
W74-09523

A CENTRIFUGAL TECHNIQUE FOR RAPIDLY ESTIMATING THE PERMEABILITY OF A CONSOLIDATED SANDSTONE,
Birmingham Univ. (England). Dept. of Geology and Geophysics.
P. F. Worthington, and R. D. Barker.
Geotechnique, Vol 22, No 3, September, 1972. p 521-525.

Descriptors: *Sandstones, *Permeability, Porosity, Seismic properties, Electrical resistivity, *Centrifugation.
Identifiers: *Bunter sandstones, Intergranular permeability, Total porosity, Seismic velocity, *United Kingdom.

Geophysical investigations of the Bunter Sandstone in the Fylde area of Lancashire are being undertaken by the subdepartment of geophysics at Birmingham University. An extensive field program is supported by laboratory measurements of total porosity, intergranular permeability, seismic velocity, and electric resistivity, with the object of establishing empirical relationships between these parameters. The determination of intergranular permeability using standard techniques has proved to be by far the most time-consuming of these studies. An alternative centrifugal technique essentially depends upon the extraction of water from a saturated sandstone sample when it is subjected to a centrifugal force for a given period of time. The method described can be used to estimate, to well within an order of magnitude, the intergranular permeability of up to 300 sandstone specimens per week. (Staplin-NWWA)
W74-09527

DEPTH PREDICTION FOR EARTH-PENETRATING PROJECTILES,
Sandia Labs., Albuquerque, N. Mex. Terradynamics Div.
For primary bibliographic entry see Field 8D.
W74-09534

8F. Concrete

HARDENED PORTLAND CEMENT PASTES OF LOW POROSITY, PART 5: COMPRESSIVE STRENGTH,
Clarkson Coll. of Technology, Potsdam, N.Y.
M. Yudenfreund, K. M. Hanna, J. Skalny, and I. Odler.
Cement Concrete Research, Vol 2, No 6, p 731-743, November, 1972. 11 fig, 9 ref.

Descriptors: *Porosity, *Cement, *Concrete, Temperature, Hydration, *Compressive strength, *Pores.
Identifiers: Type I clinker, Type II clinker, *Low-porosity pastes, Pore volume, Total porosity, Degree of hydration.

The compressive strengths of low-porosity pastes made from a Type I and a Type II clinker were investigated. Besides the effect of the type of cement, the effects of different grinding aids, surface of the cement, water-cement ratio (0.2 and 0.3), temperature of hydration (5 C, 25 C, and 50C), and the age of the paste on compressive strength were determined. The strength results correlated well with degree of hydration and total porosity, but there was definite indication of at least one other factor. The distribution of pore volume in pores of different sizes is suggested as a third factor influencing compressive strength. (Campbell-NWWA)
W74-09522

8G. Materials

OPERATION AND MAINTENANCE OF WELLS,
Stamm-Scheele, Inc., Rayne, La.
W. Arceneaux.
Journal American Water Works Association, Vol 66, No 3, p 199-204, March, 1974. 1 tab.

Descriptors: *Corrosion, Groundwater, *Wells, Chemical degradation, Chemical properties, Fouling, Scaling, *Corrosion control, Operation and maintenance.
Identifiers: *Incrustation, Acid treatment, Polyphosphate treatment.

Incrustation and corrosion are common problems encountered in wells. Several chemical means of reducing and removing incrustation and corrosion are discussed: acid treatment; chlorine treatment, polyphosphate treatment. Effectivenss of the above methods is greatly enhanced by vigorous agitation. The need for proper maintenance and record keeping is stressed. Methods of agitation and material relating to well screen design are presented. Finally, criteria are given for selection of the proper pump for a well. (Campbell-NWWA)
W74-09524

FUNDAMENTALS OF CATHODIC PROTECTION,
Harco Corp., Cleveland, Ohio. Cathodic Protection Div.
B. Husock.
Presented at AIEE Joint Southwest and Mid-America District Meeting, April 30-May 2, 1962, St. Louis, Missouri. 7 p, 7 fig, 7 ref.

Descriptors: *Corrosion, *Cathodic protection, *Corrosion control, Anodes, Cathodes, Electric currents, Chemical reactions, Oxidation, *Electrolytes.
Identifiers: Galvanic corrosion, Electrolytic corrosion, Stray currents.

Cathodic protection is an electrical method of preventing corrosion. It is used on metallic structures which are in electrolytes such as soil or water. It has had widespread application on underground pipelines, and has been found to be effective on numerous other underground and underwater structures such as lead cables, water storage tanks, lock gates and dams, steel pilings, well casings, ship hulls and interiors, water treatment equipment, trash racks and screens, etc. Methods of application are described. (Staplin-NWWA)
W74-09548

APPARATUS FOR RELEASING CHEMICALS CLEARING AND CLEANING WASTE PIPES,
For primary bibliographic entry see Field 5D.
W74-09725

INSTALLATION OF LARGE-DIAMETER FIBER-GLASS FLEXIBLE PIPE IN MUNICIPAL SYSTEMS,
Johns-Manville Corp., Denver, Colo.
For primary bibliographic entry see Field 8A.
W74-09727

ENGINEERING AND CONSTRUCTION PRACTICES FOR GRAY AND DUCTILE CAST-IRON PIPE,
Cast Iron Pipe Research Association, Oak Brook, Ill.
For primary bibliographic entry see Field 8B.
W74-09728

8I. Fisheries Engineering

FISH REARING IN THE RICE FIELDS OF THE VOLGA DELTA, (IN RUSSIAN).,
V. P. Ivanov, and N. I. Astapova.
Tr Kasp Nauch No-Issled Inst Rybn Khoz. 26 p241-244. 1971.
Identifiers: Deltas, Fish rearing, Rice fields, *USSR(Volga delta), *Crop rearing.

Rearing of carp fingerlings obtained as a result of the spawning of brood stock in drainage canals proved to be most effective. At a stocking density of 1 nest of spawners per hectare of drainage area and adjacent basins, fish productivity was 3.5 centners/ha. The average weight of the fingerlings was 75.8 g and the calculated profit is 300-400 rubles/ha. An analysis of other variants of the experiment is given.--Copyright 1974, Biological Abstracts, Inc.
W74-09284

FEEDING AND GROWTH OF YOUNG BREAM AT SPAWNING AND REARING FARMS OF THE VOLGA DELTA UNDER STREAM-FLOW CONTROL CONDITIONS, (IN RUSSIAN),
O. N. Vasil' Chenko.
Tr Kasp Nauch No-Issled Inst Rybn Khoz. 26 p, 192-198. 1971.
Identifiers: Abramis-Brama, *Bream, Crustaceans, Deltas, Growth rates, Plankton, *Spawning, *USSR(Volga delta), *Fish diets, *Fish rearing, Fish hatcheries.

Results are presented of a study of the changes in feeding habits and growth of young bream (Abramis brama) at all developmental stages in the spawning and rearing farms of the Volga delta (USSR) after its stream-flow control. The qualitative composition of the food of young bream in 1967-1968 was practically the same as in 1940-1952. At larval stages, the bream consumed planktonic and at juvenile stages planktonic and periphytonic organisms. The maximum intensity of feeding was noted in mid-May, when the biomass of planktonic crustaceans in bodies of water reached a maximum. The rate of growth of the young bream at early developmental stages did

not undergo substantial changes in accordance with the feeding habits. At juvenile stages, the growth rate of the young bream dropped almost by half, which indicates the need to use intensification measures at the spawning-rearing farms to improve the food base of the bodies of water.--Copyright 1974, Biological Abstracts, Inc.
W74-09313

THE EFFECTS OF LAND USE ON SALMON PRODUCTION,
Alaska State Dept. of Fish and Game, Juneau.
For primary bibliographic entry see Field 4C.
W74-09411

ARTIFICIAL FEEDING OF CARP FRY,
A. E. Iman, and A. P. Habashy.
Bul Inst Oceanogr Fish. 2: p 261-274. 1972.
Identifiers: *Artificial feeding, Carbohydrates, *Carp fry, *Growth rates, Minerals, Protein, Vitamins.

Selection was made of the most effective and economic artificial diet for the production of healthy carp fry in a short period. During the first week, carp fry depend completely upon natural food, after which, artificial food can be introduced as a supplementary diet to balance the natural one and to enhance growth rate. Artificial food which gave the highest growth rate contained a protein level of about 35%, a carbohydrate level of about 49% and also vitamins and mineral salts. The rate of stocking of fry/m2 is an important factor. The most suitable rate of stocking of carp fry was 10 fry/m2. If the nursery ponds are prepared to furnish a good supply of natural food and the proper rate of stocking, together with a suitable artificial diet, the desired number of healthy carp fry in a certain period can be obtained.--Copyright 1974, Biological Abstracts, Inc.
W74-09501

THE COMMERCIAL FEASIBILITY OF REARING POMPANO, TRACHINOTUS CAROLINUS (LINNAEUS), IN CAGES,
Miami Univ., Fl. Sea Grant Program.
T. I. J. Smith.
Available from the National Technical Information Service as COM-73-10771, $3.00 in paper copy, $1.45 in microfiche. Sea Grant Technical Bulletin No 26, January 1973. 6 fig, 13 tab, 65 ref. NOAA 2-35147.

Descriptors: *Aquiculture, *Commercial fish, *Marine fish, Fish farming, Growth rates, Florida, Cooling water, Thermophilic animals, Economics, Fish diets, Feasibility studies.
Identifiers: *Pompano, Cages.

The Florida pompano yields the highest retail price among commercial fish sold in the southern United States. Aquaculture of pompano using 6.4 mm mesh in 1-cu m aluminum cages, under stocking densities of 100, 250, 400, 650 and 900 was investigated near to Biscayne Bay, Florida. Water temperatures were stabilized as a result of thermal effluent from a nearby power plant. Results suggest that a marketable fish may be produced in 47-51 weeks. While the final growth and yield per fish were highest for low density cages, greatest total yield was obtained from high density cages. Mortality and food conversion levels were also examined with no significant differences among densities found. Half of overall mortality (21%) was due to dietary inadequacy. Fouling represented the major difficulty although some body abrasions might also be attributed to the cages. No significant disease or parasite problems were found. Feed costs to raise 1 kg of pompano vary from $1.70 (100 density) to $2.17 (900 density) with cage and labor cost for all distributed for 10 months at $2.79 and $31.25, respectively. Highest profits ($160) are generated from the 900 stocking density. Cage conditioning indicates that released pompano will remain in the area allowing cultivation without confining structures. (Schroeder-Wisconsin)
W74-09566

AN INITIAL EVALUATION OF ETHYLENE OXIDE FOR THE STERILIZATION OF FORMULATED AND PELLETED FISH FEEDS,
Victoria Univ. (British Columbia). Dept. of Bacteriology and Biochemistry.
For primary bibliographic entry see Field 2I.
W74-09723

AN INVESTIGATION INTO AGE AND LENGTH/MASS RELATIONSHIP OF TILAPIA MOSSAMBICA PETERS (PISCES: CHICHLIDAE) IN THE LOSKOP DAM RESERVOIR, EASTERN TRANSVAAL,
Randse Afrikaanse Universiteit, Johannesburg (South Africa). Navorsingsgroep Varswaterbiol.
P. Du Toit, J. Vermeulen, and H. J. Schoonbee.
Tydskr Natuurwet. Vol 12 No 3, p 129-147, 1972, Illus. English summary.
Identifiers: Age, *Cichlidae, Length, Mass, Pisces, Reservoirs, Scale, *Tilapia-Mossambica, *Transvaal(Loskop Dam Reservoir), *South Africa.

A close relationship exists between total length and scale-radius of T. mossambica. No accurate assessment of the age of T. mossambica in Loskop Dam is possible from either length or weight determinations.--Copyright 1973, Biological Abstracts, Inc.
W74-09754

NOTES ON THE RATIO TOTAL LENGTH/SCALE RADIUS OF TILAPIA MOSSAMBICA PETERS (PISCES:CICHLIDAE) IN THE LOSKOP DAM RESERVOIR EASTERN TRANSVAAL,
Randse Afrikaanse Universiteit, Johannesburg (South Africa). Navorsingsgroep Varswaterbiol.
J. Vermeulen, H. J. Schoonbee, and P. Du Toit.
Tydskr Natuurwet Vol 12, No 3, p 148-152, 1972, Illus. English summary.
Identifiers: *Cichlidae, Length, Pisces, Reservoirs, Scale, Season, *Tilapia-Mossambica, *Transvaal(Loskop Dam reservoir), *South Africa.

A seasonal study of the total length/scale radius of T. mossambica in the Loskon Dam Reservoir, South Africa during the period April 1967-July 1968 shows that drought may influence the value of b in the formula: Scale radius = a + b (total length) (a = constant).--Copyright 1973, Biological Abstracts, Inc.
W74-09768

NOTES ON THE CONDITION FACTOR FOR TILAPIA MOSSAMBICA PETERS (PISCES:CICHLIDAE) IN LOSKOP DAM RESERVOIR, EASTERN TRANSVAAL,
Randse Afrikaanse Universiteit, Johannesburg (South Africa). Navorsingsgroep Varswaterbiol.
H. J. Schoonbee, J. Vermeulen, and P. Du Toit.
Tydskr Natuurwet, Vol 12, No 3, p 153-157, 1972, Illus. English summary.
Identifiers: Age, *Cichlidae, Length, Pisces, Reservoirs, *Tilapia-mossambica, *Transvaal(Loskop Dam reservoir), Weight, *South Africa.

A modified formula is used to calculate the condition factor for T. mossambica. For the purpose of comparison, condition factors calculated should be employed for the same age groups only, for the same species of fish. In such a case it is considered justified to compare fish from the same body of water for various seasons of the year, or even for a period of years.--Copyright 1973, Biological Abstracts, Inc.
W74-09781

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

UNIVERSITY RESEARCH AND PRACTICE: AN INSTITUTIONAL CONFRONTATION,
California Univ., Los Angeles. School of Architecture and Urban Planning.
For primary bibliographic entry see Field 6E.
W74-09421

WATER RESOURCES PROBLEMS AND RESEARCH NEEDS IN MINNESOTA, 1974 - GUIDELINES FOR RESEARCH PROGRAMS,
Minnesota Univ., St. Paul. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W74-09656

WATER RESOURCES CENTER ANNUAL REPORT, JULY 1, 1972-JUNE 30, 1973.
California Univ., Davis. Water Resources Center.
Available from the National Technical Information Service as PB-233 728, $8.00 in paper copy, $1.45 in microfiche. Report No 28, March 1974. 95 p. OWRR A-999-CAL(8).

Descriptors: *Freshwater, *Research and development, *Water resources institute, Universities, Training, Education, *California, Grants, Contracts, *Projects, *Project benefits.

The principal investigators of fresh water projects sponsored by the Water Resources Center have submitted their annual reports, from which the most essential information has been abstracted to form this narrative section. The individual narratives have been purposely kept brief. Each emphasizes, wherever possible, the 'hard' results and the actual or potential applications of those results to benefit affected interests. Shown also are starting and scheduled ending dates for each research project. The reader may infer from these the relative degree of progress achieved to date, together with an indication of when further information might become available--usually at least six months after completion of the project for any detailed account. The Report covers both State of California and Federally funded research activities. (Snyder-California, Davis)
W74-09659

9D. Grants, Contracts, and Research Act Allotments

WATER RESOURCES CENTER ANNUAL REPORT, JULY 1, 1972-JUNE 30, 1973.
California Univ., Davis. Water Resources Center.
For primary bibliographic entry see Field 9A.
W74-09659

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

HYDROLOGIC DATA STORAGE AND RETRIEVAL SYSTEM,
Nevada Univ., Reno. Center for Water Resources Research.
For primary bibliographic entry see Field 07C.
W74-09401

10C. Secondary Publication And Distribution

COMMUNICATIONS FOR URBAN WATER RESOURCES MANAGEMENT--A REVIEW AND ANNOTATED BIBLIOGRAPHY,
Gates (W. E.) and Associates, Inc., Fairfax, Va.
For primary bibliographic entry see Field 06B.
W74-09251

GROUND WATER QUALITY AND SOLID WASTE MANAGEMENT-- A SELECTIVE BIBLIOGRAPHY,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 05E.
W74-09319

10D. Specialized Information Center Services

AN INFORMATION SYSTEM FOR THE MANAGEMENT OF LAKE ONTARIO,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 02H.
W74-09752

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W74-09341 2C

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The Behaviors of Heavy Metals in the Regeneration Process of Sewage Treatment Activated Carbon, (Gesui shori kasseitan no kanetsu saiseiji ni okeru jukinzoku no kyodo),
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Wastewater Treatment Using Electrolysis with Activated Carbon Cathode,
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* U. S. GOVERNMENT PRINTING OFFICE : 1974 592-935

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AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

- NATURE OF WATER
- WATER CYCLE
- WATER SUPPLY AUGMENTATION AND CONSERVATION
- WATER QUANTITY MANAGEMENT AND CONTROL
- WATER QUALITY MANAGEMENT AND PROTECTION
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VOLUME 7, NUMBER 19
OCTOBER 1, 1974

W74-09801 -- W74-10350

SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

VOLUME 7, NUMBER 19
OCTOBER 1, 1974

W74-09801 -- W74-10350

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
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06 WATER RESOURCES PLANNING
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07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

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1B. Aqueous Solutions and Suspensions

INTERFACIAL INTERACTION OF WATER AND SILICATE MINERALS,
Missouri Univ., Kansas City. Dept. of Physics.
For primary bibliographic entry see Field 2K.
W74-09805

ASSOCIATION CONSTANTS OF ION PAIRS IN NATURAL WATERS,
Missouri Univ., Columbia. Dept. of Geology.
For primary bibliographic entry see Field 2K.
W74-09806

2. WATER CYCLE

2A. General

A PRELIMINARY REPORT ON URBAN HYDROLOGY AND URBAN WATER RESOURCES: OAHU, HAWAII,
Hawaii Unin., Honolulu. Water Resources Research Center.
Y. S. Fok.
Available from the National Technical Information Service as PB-233 783 $3.75 in paper copy, $1.45 in microfiche. Technical Report No 74, October 1973. 44 p, 10 fig, 6 tab, 25 ref. OWRR B-028-HI(1), 14-31-0001-3873.

Descriptors: *Hawaii, Watersheds(Basins), Storm drains, *Urban hydrology, Unit hydrographs, Streamflow, Rainfall-runoff relationships, Simulation analysis, Model studies, Data collections, Computer programs.
Identifiers: *Oahu(H.I.), Storm hydrographs.

Project objectives were to: evaluate several watershed simulation models for their applicability to local conditions, expand the data collection in the research watersheds, and identify problem areas for subsequent study. The instantaneous unit hydrograph theory was explored in detail with results indicating the Nash method to have best applicability. The Kentucky Watershed Model's principle of continuous balancing of the water budget within a given watershed is applicable to Hawaiian conditions, but would require two to three years for its applicable to Hawaiian conditions, but would require two to three years for its modification. The Road Research Laboratory Model was tested using three storm events, but the input data seemed inadequate to providing the desirable simulation. The Multiple Regression Model was applied to correlate peak flow to the drainage area, urbanized area, rainfall, and time to peak. Results indicated that the model is very promising. Several mathematical conceptual models were also tested, and the nonlinear time variant watershed model was found to be the best. Some water quality elements were measured during 1972-73. Only a few samples were taken due to the very dry weather. The data collection program has been expanded to include evaporation, soil moisture, wind speed, solar radiation, and water quality in addition to rainfall and streamflow records gathered since initiation of the project.
W74-09803

STOCHASTIC ANALYSIS OF PHREATIC AQUIFERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W74-09882

A PARTIAL AREA MODEL FOR STORM FLOW SYNTHESIS,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
E. T. Engman, and A. S. Rogowski.
Water Resources Research, Vol 10, No 3, p 464-472, June 1974. 8 fig, 1 tab, 28 ref.

Descriptors: *Storm runoff, *Rainfall-runoff relationships, *Hydrograph analysis, *Mathematical models, Overland flow, Synthetic hydrology, Infiltration, Base flow, Simulation analysis.

A storm hydrograph model is based on the partial contributing area concept. It utilizes a physically based infiltration capacity distribution for computation of rainfall excess, and it incorporates two stages of kinematic routing. In the first stage the rainfall excess is routed over a flow plane to become the lateral inflow hydrograph for the second or channel phase. The overland flow plane expands upslope as the infiltration capacity is exceeded, and the size of contributing area and the length of the flow plane is calculated from infiltration curves. The model attempts to account for the natural watershed variability in terms of necessary input data and boundary and initial conditions. The data requirements are three: they include two Manning's n values, one for the channel and one for the overland flow plane, and the initial soil water content. (Knapp-USGS)
W74-09907

EXPECTED RANGE AND ADJUSTED RANGE OF HYDROLOGIC SEQUENCES,
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W74-09908

SEASONAL EFFECTS IN FLOOD SYNTHESIS,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W74-09910

PROBLEMS IN MODELING URBAN WATERSHEDS,
American Society of Civil Engineers, Marblehead, Mass. Urban Water Resources Research Program.
For primary bibliographic entry see Field 4C.
W74-09911

INTERNATIONAL HYDROLOGICAL DECADE (MEZHDUNARODNOYE GIDROLOGICHESKOYE DESYATILETIYE).
Meteorologiya i Gidrologiya, No 12, p 116-117, December 1973.

Descriptors: *International Hydrological Decade, *Conferences, *Forecasting, *Hydrology, *Data collections, Foreign countries.
Identifiers: USSR, *Danube River.

The Seventh Conference of Danube countries on Hydrologic Forecasting was held at the Golden Sands health spa near Varna (People's Republic of Bulgaria) June 5-10, 1973. Participants included delegates from the People's Republic of Bulgaria (20), the USSR (19), Yugoslavia (16), Czechoslovakia (9), the Federal Republic of Germany (10), Austria (9), the Hungarian People's Republic (2), and Romania (1), as well as representatives of UNESCO and the Danube Commission. A total of 44 papers were presented, including 26 papers on problems of forecasting the water regime, 6 papers on problems of forecasting the ice regime, 8 papers on problems of channel processes and water quality, and 4 papers on other problems of hydrology. The Soviet contribution consisted of 13 papers. A characteristic feature of most papers was the broad application of modern methods of mathematical analysis by computers for hydrologic forecasting. A large number of papers were devoted to formulation of mathematical models and to physical analysis of hydrologic processes. Papers from the Soviet Union contained results of investigations of important general problems of hydrologic forecasting and specific recommendations on procedures to be followed in forecasting water and ice regimes of the Danube. Papers of the Seventh Conference were forwarded to libraries of the USSR Hydrometeorological Center and the Ukrainian Hydrometeorological Scientific Research Institute. (Josefson-USGS)
W74-09934

NETWORK FLOW MODELING OF MULTIRESERVOIR DISTRIBUTION SYSTEMS,
Texas Univ., Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 4A.
W74-09952

MORPHOGENETIC STUDY OF TERMINAL TRIANGULAR TRACT OF INLAND STREAMS IN SUTLEJ YAMUNA PLAIN,
Punjab Univ., Chandigarh (India).
For primary bibliographic entry see Field 2E.
W74-10052

WATER ATLAS OF THE UNITED STATES,
For primary bibliographic entry see Field 7C.
W74-10107

AN ERTS VIEW OF ALASKA--REGIONAL ANALYSIS OF EARTH AND WATER RESOURCES BASED ON SATELLITE IMAGERY,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 7B.
W74-10251

2B. Precipitation

RADIOACTIVE FALLOUT IN AIR AND RAIN: RESULTS TO THE MIDDLE OF 1973,
Atomic Energy Research Establishment, Harwell (England).
For primary bibliographic entry see Field 5B.
W74-09876

NUMERICAL EXPERIMENT FOR SOLVING COMPLETE EQUATIONS OF HYDRODYNAMICS,
M. R. Pipko.
Available from NTIS, Springfield, Va 22151 AD-763 143, Price $3.00 printed copy; $1.45 microfiche. Air Force Systems Command Foreign Technology Division Translation Report FTD-HT-23-593-73, June 20, 1973. 11 p, 2 fig, 10 ref. (Translation of Ob' yektivnyy Analiz Meteorologicheskikh Poley 1969, p 19-28.)

Descriptors: *Weather forecasting, *Numerical analysis,(Athematical models, Winds, Hydrodynamics.

The equations of hydrodynamics were solved for a numerical weather forecast by using the method of small perturbations. The problem was solved for an incompressible, homogeneous, inviscid, divergent atmosphere. The solutions reflect all the transformations which occurred over a two-day period. The position of centers is forecast and the cyclogenesis process is represented well. (Knapp-USGS)
W74-09898

POINT PROCESSES OF SEASONAL THUNDERSTORM RAINFALL 2. RAINFALL DEPTH PROBABILITIES,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
R. E. Smith, and H. A. Schreiber.
Water Resources Research, Vol 10, No 3, p 418-423, June 1974. 6 fig, 1 tab, 13 ref.

Descriptors: *Thunderstorms, *Rainfall, *Probability, Depth-area-duration analysis, Statistics, Statistical methods, Stochastic processes, Distribution patterns.

The probabilistic nature of daily rainfall depths was examined. Daily rainfall depths were well described by a compound exponential distribution. Some 1600 to over 2000 daily rainfalls from three stations were partitioned in various conceptual ways to evaluate homogeneity with respect to the pattern of occurrence with sequences or seasons as well as the annual variance of population properties. Although some small but statistically significant inhomogeneities were found, the statistical description of depths in arbitrary intervals, such as annual total depths, is treatable as the sum of a random number of independent random variables by using the model for rainy day occurrence. Simulations from this model match well the measured data from the stations treated. The effect of truncation of the rainfall sample on both depth distribution and Markov chain dependence is discussed. Daily depths are functions of individual storm occurrence probability (number per day) and storm depth distributions. (See also W74-09928) (Knapp-USGS)
W74-09927

POINT PROCESSES OF SEASONAL THUNDERSTORM RAINFALL 3. RELATION OF POINT RAINFALL TO STORM AREAL PROPERTIES,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
R. E. Smith.
Water Resources Research, Vol 10, No 3, p 424-426, June 1974. 3 fig, 8 ref.

Descriptors: *Thunderstorms, *Rainfall, *Probability, Depth-area-duration analysis, Statistics, Statistical methods, Stochastic processes, Distribution patterns.

Study of the stochastic nature of thunderstorm occurrence and the probability of daily rainfall depths shows the importance of point rainfall information to areal rain distribution. A probabilistic expression is given for the relationship between the point depth of rainfall, the local probability distribution of storm cell maximum depth, and the dimensionless expression of storm depth-area pattern. In a sample test the expression was successfully used to reproduce point rainfall depth probability from storm maximum depth distribution and depth area data from Tombstone, Arizona. (See also W74-09927) (Knapp-USGS)
W74-09928

SPLASH CORRECTION FACTORS FOR SOIL EROSION STUDIES,
Agricultural Research Service, Saint Paul, Minn.
For primary bibliographic entry see Field 2J.
W74-10210

PROTECTION AGAINST HAILSTORMS IN MOLDAVIA,
For primary bibliographic entry see Field 3B.
W74-10232

SUMMARY REPORT--WEATHER MODIFICATION, FISCAL YEARS 1969, 1970, 1971,
GEOMET, Inc., Rockville, Md.
For primary bibliographic entry see Field 3B.
W74-10233

EXPERIMENTAL AND THEORETICAL INVESTIGATIONS OF ARTIFICIAL CRYSTALLIZATION AND DISPERSAL OF SUPERCOOLED CLOUDS,
For primary bibliographic entry see Field 3B.
W74-10234

AIRBORNE MEASUREMENTS OF THE SIZE DISTRIBUTION AND THE CONDENSATION AND ICE NUCLEATING ABILITY OF PARTICLES PRODUCED BY AGI CONTAINING PYROTECHNICS AND ACETONE SOLUTION BURNERS,
Pacific-Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 3B.
W74-10239

ESTIMATED RAINFALL FOR DRAINAGE CALCULATIONS IN THE UNITED KINGDOM,
Transport and Road Research Lab., Crowthorne (England).
C. P. Young.
Available from NTIS, Springfield, Va 22151 PB-226 513, Price $3.25 printed copy; $1.45 microfiche. Report LR 595, 1973. 21 p, 4 fig, 15 tab, 5 ref, append.

Descriptors: *Rainfall, *Distribution patterns, *Rainfall-runoff relationships, Statistics, Data collections, Rainfall intensity, Computer programs, *Sewers, *Designs.
Identifiers: *United Kingdom.

Tables of rainfall in the United Kingdom were computed from the Bilham rainfall formula, taking account of the latest work of the Meteorological Office. An algorithm for calculating the figures is presented. The rainfall profile used in most of the computer programs based on TRRL hydrograph method of sewer design is also given. (Knapp-USGS)
W74-10241

REACTION OF HYGROSCOPIC PARTICLES TO A WARM FOG,
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W74-10253

CLOUD-PARTICLE SAMPLES AND WATER CONTENTS FROM A 1969 STORMFURY CLOUDLINE CUMULUS,
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W74-10254

ENGINEERING FOG-MODIFICATION EXPERIMENTS BY COMPUTER MODELLING,
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W74-10255

DEVICE FOR AUTOMATIC REMOTE DATA COLLECTION (DARDC),
National Weather Service, Silver Spring, Md. Engineering Div.
For primary bibliographic entry see Field 7A.
W74-10256

2C. Snow, Ice, and Frost

ICE MELTING EXPERIMENTS--A MODEL STUDY FOR BURIAL OF RADIOACTIVE WASTES,
Sandia Lab., Albuquerque, N.Mex.
For primary bibliographic entry see Field 5D.
W74-09868

APPROXIMATE SOLUTION TO THE FREEZING OF THE ICE-WATER SYSTEM WITH CONSTANT HEAT FLUX IN THE WATER PHASE,
New Hampshire Univ., Durham. Dept. of Chemical Engineering.
S. D. Foss, and S. S. T. Fan.
Water Resources Research, Vol 10, No 3, p 511-513, June 1974. 4 fig, 1 tab, 5 ref.

Descriptors: *Freezing, *Heat transfer, *Thermodynamics, Water temperature, Air temperature, Convection, Advection, Ice-water interfaces, Heat flow.

By utilizing the assumption of a quasi steady state temperature profile for the solution to the Stefan problem an approximate solution to the ice-water problem in which a constant heat flux exists in the water phase is developed. Two hypothetical cases are studied. Case 1 considers a step change in the ambient air temperature. Case 2 considers the effect of sinusoidal ambient air temperature fluctuations. A method is given for determining the characteristics heat flux in the water phase. (Knapp-USGS)
W74-09903

A MODIFIED METHOD OF AERIAL SURVEY OF SHADOWS TO STUDY SNOW COVER (NOVYY VARIANT SPOSOBA AEROFOTOS'YEMKI TENEY DLYA IZUCHENIYA SNEZHNOGO POKROVA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
Yu. D. Sharikov, and V. G. Zdanovich.
Meteorologiya i Gidrologiya, No 12, p 72-76, December 1973. 2 fig, 1 tab, 5 ref.

Descriptors: *Snow cover, *Snow surveys, *Aerial photography, Aircraft, Height, Equations, Remote sensing.
Identifiers: USSR.

A modified method of determining thickness of snow cover in mountains by aerial surveys of shadows cast by special stakes is proposed. The stakes were cut from a wooden block 8-10 cm thick. Thin boards 100 x 10 cm and 1.0-1.5 cm thick were used as crosspieces. Three crosspieces spaced 1 m apart were nailed to each stake. The upper crosspiece was secured directly to the top of the stake. The total height of the stakes was 4-5 m. To determine the accuracy of the procedure, heights of the stakes calculated from images of the shadows were compared with actual field values obtained before the aerial survey. Differences in heights of the stakes measured directly and obtained from aerial data did not exceed 1 decimeter. The procedure does not require knowledge of flight altitude, slope angles of the terrain, latitude of the station, or moment of observation. Results of these surveys can be used to estimate water levels in water bodies and streams. (Josefson-USGS)
W74-09930

EXPERIMENT IN DETERMINATION OF WATER EQUIVALENT OF SNOW IN MOUNTAINS BY ABSORPTION OF GALACTIC COSMIC RADIATION (OPYT OPREDELENIYA ZAPASOV VLAGI V SNEZHNOM POKROVE V GORAKH PO POGLOSHCHENIYU GALAKTICHESKOGO KOSMICHESKOGO IZLUCHENIYA),
Institut Prikladnoi Geofiziki, Moscow (USSR).
S. I. Avdyushin, Yu. F. Barabanshchikov, R. M. Kogan, Yu. M. Kulagin, and I. M. Nazarov.
Meteorologiya i Gidrologiya, No 12, p 98-102, December 1973. 2 fig, 1 tab, 6 ref.

Descriptors: *Snowpacks, *Water equivalent, *Mountains, *Radiation, *Absorption, Measurement, Instrumentation, Remote sensing, Gravimetry, Equations.
Identifiers: *USSR(Maykhura River valley-Tadzhikistan).

A study of water equivalent of snow in mountainous areas is an important problem which is being solved in behalf of agriculture and hydraulic construction. To determine water equivalent of snow in mountains by recording the intensity of flow of cosmic particles, the high-altitude (2,800 m) Kharam-Kul' snow avalanche station in the Maykhura River valley in Tadzhikistan was selected. This region is characterized by a large water equivalent of snow, reaching 2,000 mm in individual years (1971). At a water-equivalent range of 10-900 mm, the accuracy of measurement of water equivalent by absorption of cosmic radiation is 34 mm. The basic error in determination of water equivalent arises from variability of cosmic radiation. Water equivalent in the 300-10,000 mm range should be measured by absorption of cosmic radiation, and variations of cosmic radiation must be monitored for calibration purposes. The results of measurements can be completely automated, and their results can be telemetered. To study areal distribution of water equivalent of snow in mountains, station determinations should be combined with aircraft measurements, based on a recording of the natural gamma radiation of the Earth. Ways are indicated for further development of remote methods of measurement of water equivalent of snow in mountains. (Josefson-USGS)
W74-09932

MODELING THE PACK ICE AS AN ELASTIC-PLASTIC MATERIAL,
Washington Univ., Seattle. Div. of Marine Resources.
M. D. Coon, G. A. Maykut, R. S. Pritchard, D. A. Rothrock, and A. S. Thorndike.
AIDJEX Bulletin 24, Washington University Division of Marine Resources, p 1-105, May 1974. 47 fig, 4 tab, 31 ref, 2 append. NSF Grant GV-28807 ONR Contract N00014-67-A-0103-0007.

Descriptors: *Sea ice, *Ice cover, *Deformation, Melting, Freezing, Elasticity(Mechanical), Plasticity, Plastic deformation, *Mathematical models, Stress, Strain.

A model of the motion of drifting pack ice in the Arctic Ocean treats explicitly the growth and melt rates of the ice, the formation of leads and pressure ridges, and a mechanical response which is elastic at low stress levels and plastic at some higher, critical state of stress. The strength of the ice is determined by its thickness distribution, and therefore varies because of both thermal and mechanical effects. To examine the behavior of the model, several calculations were made specifying the strain rate history of a single element of pack ice and solving for the ice thickness distribution and the states of stress in the ice. (Knapp-USGS)
W74-09941

STRAIN CALCULATIONS USING AIDJEX 1972 POSITION DATA,
Washington Univ., Seattle. Div. of Marine Resources.
A. S. Throndike.
AIDJEX Bulletin 24, Washington University Division of Marine Resources, p 107-129, May 1974. 10 fig, 3 tab, 3 ref. ONR Contract N00014-67-A-0103-0007.

Descriptors: *Strain, *Stress, Movement, Sea ice, Surveys, Deformation.

Strain and strain rate calculations of sea ice were based on measurements of the positions of three drifting sea ice stations. The measurements were made using the Navy Navigation Satellite System. In processing the data, time derivatives were calculated by Kalman smoothing techniques, and space derivatives by simple finite differences. (Knapp-USGS)
W74-09942

FRACTURE OF SEA ICE SHEETS DUE TO ISOSTATIC IMBALANCE,
Seattle Univ., Wash. Dept. of Civil Engineering.
R. T. Schwaegler.
AIDJEX Bulletin 24, Washington University Division of Marine Resources, p 131-144, May 1974. 7 fig, 6 ref. NSF Grant GV-28807.

Descriptors: *Sea ice, *Deformation, *Failure(Mechanics), Strain, Stress.

The nonuniform thickness of sea ice sheets creates regions of isostatic shear imbalance. The resulting bending stresses are sufficient to cause cracking. The ice sheet was modeled as floating elastic plate with constant flexural rigidity. Variable thickness was obtained by representing the bottom surface as a sine wave. Upper and lower bound curves were obtained for the amplitude of the bottom surface variation versus ice breaking strength. (Knapp-USGS)
W74-09943

INTERNATIONAL SYMPOSIUM ON WASTE-WATER TREATMENT IN COLD CLIMATES.
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5D.
W74-10160

ON THE INTERACTION OF WATER AND HEAT TRANSPORT IN FROZEN AND UNFROZEN SOILS: I. BASIC THEORY; THE VAPOR PHASE,
Geulph Univ. (Ontario). Dept. of Land Resource Science.
B. D. Kay, and P. H. Groenevelt.
Soil Science Society of America Proceedings, Vol 38, No 3, p 395-400, May-June 1974. 16 ref.

Descriptors: *Soil water movement, *Frozen soils, *Water vapor, *Heat transfer, Mass transfer, Porous media, Osmosis, Convection, Thermodynamics, Energy dissipation.

A theory is presented for the transport in porous media of water in response to a temperature gradient and the transport of heat in response to a water pressure gradient. These processes were formulated by using the equation of energy dissipation and the Clapeyron equation. Several general forms of the Clapeyron equation were developed in order to find expressions for the transport coefficients of concern. The coupled flow processes are related to the heat of vaporization, the heat of fusion, and the partial specific heat of wetting of the soil water. (See also W74-10216) (Knapp-USGS)
W74-10215

ON THE INTERACTION OF WATER AND HEAT TRANSPORT IN FROZEN AND UNFROZEN SOILS: II. THE LIQUID PHASE,
Geulph Univ. (Ontario). Dept. of Land Resource Science.
P. H. Groenevelt, and B. D. Kay.
Soil Science Society of America Proceedings, Vol 38, No 3, p 400-404, May-June 1974. 10 ref.

Descriptors: *Soil water movement, *Frozen soils, *Water vapor, *Heat transfer, Mass transfer, Porous media, Osmosis, Convection, Thermodynamics, Energy dissipation.

A theory is presented for the transport in frozen and unfrozen porous media of water in response to a temperature gradient and the transport of heat in response to a water pressure gradient. The coupled flow processes occurring in the liquid phase are analyzed. The cause of these processes is the existence of the heat of wetting and the heat of fusion. Expressions for and relations between the transport coefficients were developed. Their magnitude was estimated by model calculations. (See also W74-10215) (Knapp-USGS)
W74-10216

EFFECT OF SNOWSTORMS ON SNOW TRANSPORT FROM MOUNTAINOUS PLATEAUS (VLIYANIYE METELEY NA S'YEM I PERENOS SNEGA S GORNYKH PLATO),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
I. S. Grishin.
Vodnyye Resursy, No 2, p 195-199, 1974. 2 fig, 1 tab, 2 ref.

Descriptors: *Snow, *Snow cover, *Snow surveys, *Storms, Winds, Curves.
Identifiers: *USSR(Ural Mountains).

To study problems of snow transport from mountainous plateaus, onsite investigations were carried out in the Bol'shaya Khadata Basin in the Polar Urals at the end of the 1970-71 and 1971-72 winter periods. On the basis of studies of snow distribution patterns, relations were obtained between amount of snow transport by storms and size of the plateau and between volume of transported snow accumulated on leeward slopes of the plateau and length of the snowshed area. Total snow transport, calculated in cu m/m, is closely related to snowstorm duration, expressed in hours. The relations obtained are needed to determine quantitative characteristics of snow transport and balance characteristics of snow cover. Similar relations can be obtained for other, higher-altitude and less readily-accessible regions. (Josefson-USGS)
W74-10221

DIVISION OF THE USSR INTO ZONES BASED ON SNOW LOADS ON A HORIZONTAL SURFACE (RAYONIROVANIYE TERRITORII SSSR PO SNEGOVOY NAGRUZKE NA GORIZONTAL'NUYU POVERKHNOST'),
Main Geophysical Observatory, Leningrad (USSR).
M. V. Zavarina, and V. I. Lipovskaya.
Meteorologiya i Gidrologiya, No 9, p 69-71, September 1973. 1 fig, 1 tab, 5 ref.

Descriptors: Snow, *Snow cover, *Surfaces, *Loads(Forces), *Load distribution, Weight, Snow surveys, Snowfall, Water equivalent, Density, Depth, Roofs, Statistical methods, Probability, Maps.
Identifiers: *USSR, *Snow loads.

Regions of the USSR were mapped on the basis of snow-load values on a horizontal surface with a 5-year recurrence interval. Snow loads were calculated from an integral curve of annual water equivalent of snow during a 10-day period of maximum snow depth. The map can be used to calculate snow loads on roofs. Average weights of snow cover (in kg/sq m) in different regions of the country and limits of their variations are tabulated. As a result of a heavy 24-hour snowfall, maximum increase in snow load for 1 day in Kiev was 37 kg/sq m, in Vladivostok--54 kg/sq m, and in Batumi--52 kg/sq m. (Josefson-USGS)
W74-10264

POSSIBILITY OF MAPPING ICE CONDITIONS ON LARGE LAKES FROM SATELLITE IMAGERY (VOZMOZHNOST' KARTIROVANIYA LEDOVOY OBSTANOVKI NA KRUPNYKH OZERAKH PO SNIMKAM S ISKUSSTVENNYKH SPUTNIKOV ZEMLI),
Gosudarstvennyi Gidrologicheski Institut, Leningrad (USSR).
V. G. Prokacheva.
Meteorologiya i Gidrologiya, No 9, p 48-55, September 1973. 3 fig, 2 tab, 6 ref.

Descriptors: *Ice, *Lakes, *Satellites(Artificial), *Remote sensing, *Mapping, Photography, Ice cover, Ice jams, Snow, Data collections.
Identifiers: *USSR, *Lake Ladoga(USSR), *Lake Onega(USSR), *Cartograms, Ice fields.

The Meteor system of Soviet meteorological satellites insures regular inspection of the earth's surface. Televised information from the Meteor meteorological artificial earth satellite was used in a test to obtain information on ice conditions in the vicinity of Lakes Ladoga and Onega. Synchronous cartograms made from aerial reconnaissance of ice conditions on Lake Ladoga were compared with those made from the satellite images. Cartogram comparison demonstrated good compatibility and the possibility of obtaining basic characteristics of winter conditions of the lake from satellite images. A resolution of 1 to 2 km was established between features of lake ice objects on the television images obtained from the Meteor satellite. Television images can be used to study ice conditions of large lakes, reservoirs, and mouths of large rivers. The procedures proposed for compiling cartograms of ice conditions can be used to evaluate state of lake ice cover with respect to open water, ice cover, and ice fields. Raising the resolution capability of television images from the Meteor satellite by at least 5 times and doubling the scale will greatly enhance possibilities of mapping ice conditions on water bodies and of studying their regime. Simultaneous television and infrared imagery should provide reliable observations of ice conditions on inland bodies of water. (Josefson-USGS)
W74-10266

2D. Evaporation and Transpiration

IMPROVING WATER MANAGEMENT EFFICIENCY THROUGH USE OF BIO-INDICATORS,
Kansas Agricultural Experiment Station, Manhattan.
W. L. Powers, R. A. Brady, L. R. Stone, E. T. Kanemasu, and C. D. Nickel.
Available from the National Technical Information Service as PB-233 784 $3.25 in paper copy, $1.45 in microfiche. Kansas Water Resources Research Institute, Manhattan, Contribution No 146, (1974). 39 p, 11 fig, 4 tab, 33 ref. OWRR A-049-KAN(1), 14-31-0001-3516.

Descriptors: *Irrigation practices, *Soybeans, *Evapotranspiration, *Stomata, *Bioindicators, Water management(Applied), Leaves, Soil water, Water utilization, Canopy, *Soil-water-plant relationships.

Relationships between water status of agronomic plants during ontogeny and an array of plant physiological factors were examined in an effort to determine if one or more of these factors could be effective in describing the initial occurrence of crop water deficits and thus be effective in fixing the time of irrigation. The following plant measurements were taken to determine their ability to indicate water need for soybeans: (1) stomatal resistance, (2) leaf water potential, (3) leaf-air temperature difference, and (4) leaf proline content. Various soil water stress conditions were imposed on the soybeans by irrigating at various stages of growth when predetermined soil-moisture-depletion levels were reached. Yield and degree of lodging of the soybeans under the various irrigation treatments were measured and the water use efficiency for each treatment determined. Stomatal resistance and leaf water potential were the only plant parameters for which meaningful relationships for water need were developed. Adaxial stomatal resistance of upper canopy leaves increased rapidly when soil water potentials decreased to near -4 bars. A linear relationship between soil water potential and leaf water potential measured at midday was established. Because there was a significant difference only between the irrigated and non-irrigated treatments and not among irrigation treatments, greatest water use efficiency was obtained by irrigating during the podding stage of growth or when irrigation was initiated at the 60-65% soil-moisture-depletion level in the flowering or vegetative stage. Irrigation initiated in the vegetative stage and at low soil-moisture-depletion levels resulted in lodging which would reduce yields when machine harvested.
W74-09804

PREDICTION OF WATER LOSS FROM A FALLOW FIELD SOIL BASED ON SOIL WATER FLOW THEORY,
Agricultural Research Service, Fort Collins, Colo.
H. R. Gardner.
Soil Science Society of America Proceedings, Vol 38, No 3, p 379-382, May-June 1974. 6 fig, 1 tab, 4 ref.

Descriptors: *Evaporation, *Water loss, *Soil water movement, Equations, Evapotranspiration, Diffusivity, Soil moisture, Water balance.

Evaporation from nonhomogeneous field soils may be predicted by a simple technique based on soil water flow theory. From cumulative evaporation measurements on undisturbed cores of soil, a dimensionless curve is drawn relating fractional water loss to the square root of time divided by the amount of water available for evaporation. A procedure is described to account for the residual water left in the soil from one rainfall event to the next. Predictions of cumulative evaporation made by the use of the dimensionless curve were compared with 4 years of lysimeter data on Rago silt loam. The system should work best in an area with high average potential evaporation and low rainfall such as the Great Plains. (Knapp-USGS)
W74-10218

METHODS OF CALCULATION OF EVAPORATION AND WATER REGIME IN THE ROOT ZONE OF SOIL ON WATERSHED (METODY RASCHETA ISPARENIYA I VODNOGO REZHIMA KORNEOBITAYEMOGO SLOYA POCHVY NA VODOSBORAKH),
A. R. Konstantinov.
Vodnyye Resursy, No 2, p 78-87, 1974. 3 fig, 1 tab, 30 ref.

Descriptors: *Evaporation, *Soil water movement, *Soil moisture, *Soil-water-plant relationships, *Root zone, Watersheds(Basins), Cultivated lands, Heat balance, Water balance, Diffusion, Consumptive use, Plant growth, Crop response, Biology, Equations.
Identifiers: USSR.

Methods are given for calculating evaporation from fields and watersheds, and advantages and disadvantages of the methods as determined by initial data, accuracy of computation, and conditions of application are noted. Present methods of calculating evaporation from soil include the water- and heat-balance methods, the complex method based on simultaneous use of water- and heat-balance items, the method of turbulent diffusion, and calculations of evaporation from meteorological station observation data, biological curves of plant water consumption, and empirical formulas. The concept of evaporativity is discussed, and the relation of evaporation intensity to area of the evaporating surface is investigated. Methods of calculating soil moisture changes as a function of precipitation, air temperature, humidity, biological characteristics of crops, and initial soil moisture content are described. (Josefson-USGS)
W74-10227

RECORDING WATER USE BY MEANS OF DIGITAL EQUIPMENT,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
For primary bibliographic entry see Field 7B.
W74-10332

RELATION BETWEEN EVAPOTRANSPIRATION RATE AND MAIZE YIELD,
Hebrew Univ., Rehovoth (Israel). Dept. of Agriculture.
D. Hillel, and Y. Guron.
Water Resources Research, Vol 9, No 3, p 743-748, June, 1973. 2 fig, 1 tab, 19 ref.

Descriptors: *Irrigation practices, *Crop response, *Evapotranspiration, Consumptive use, Water requirements, *Corn(Field), Efficiency.
Identifiers: *Israel(Negev region).

Water use efficiency is evaluated in terms of the ratio of dry matter yield to seasonal evapotranspiration. A 5-year maize irrigation experiment was conducted in which the root zone soil moisture balance and crop response were measured in relation to potential and actual evapotranspiration. A threshold evapotranspiration of 250-300 mm was indicated below which production was negligible and above which production rose linearly with the amount of water applied. Water use efficiency increased with higher quantities of irrigation provided that soil aeration was not impeded and potential evapotranspiration was not exceeded. It is concluded that a 'wet' irrigation regime, permitting the drop to transpire at a rate approaching the climatically induced potential and simultaneously preventing the occurrence of moisture deficits, can help to realize the full productivity of the crop. (Skogerboe-Colorado State)
W74-10339

2E. Streamflow and Runoff

REVERSE FLOW ROUTING BY THE IMPLICIT METHOD,
Iowa State Univ., Iowa City. Dept. of Hydraulics and Mechanics.
R. N. Eli, II, J. M. Wiggert, and D. N. Contractor.
Water Resources Research, Vol 10, No 3, p 597-600, June 1974. 6 fig, 4 ref.

Descriptors: *Routing, *Numerical analysis, Hydrographs, Equations, Mathematical models, Flood routing, Reservoir releases.
Identifiers: *Reverse flow routing.

The concept of 'reverse' flow routing in rivers is proposed, in which upstream flow hydrographs are specified from a downstream flow requirement. An example is given of reverse flow routing by the implicit method of solution of the equations of momentum and continuity. Reverse flow routing is further described in the context of the x-t plane. Solutions were not found in all possible directions of computation in the x-t plane. Solutions were found only in the directions of increasing time and decreasing distance (upstream). (Knapp-USGS)
W74-09886

SEASONAL VARIATION OF THE WATER MASS ALONG THE OREGON-NORTHERN CALIFORNIA COAST,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 2K.
W74-09892

RESONANT AND NONRESONANT MOTION IN A SPINDLE-SHAPED BASIN WITH AN ENTRANCE,
Mitchell Coll. of Advanced Education, Bathurst (Australia).
N. D. Thomas, and D. J. Clarke.
Limnology and Oceanography, Vol 19, No 2, p 199-208, March 1974. 6 fig, 7 tab, 14 ref.

Descriptors: *Seiches, *Surges, *Waves(Water), *Harbors, Mathematical models, Numerical analysis, Simulation analysis, Resonance.
Identifiers: *Australia.

Resonant and nonresonant motions in a spindle-shaped basin formed by the intersection of two confocal parabolae were studied. The motion

were assumed to be caused by the formation of a standing wave due to incident wave action through the entrance. The spindle basin was transformed into a square region with two entrances and the modified boundary value problem was solved approximately by the Galerkin method. The trial functions were chosen to satisfy the boundary conditions across the entrances in the square region. The amplification of the incident waves was calculated for the internal points of the spindle basin at various frequencies; those frequencies causing large amplifications were found. The results were applied to Port Kembla Outer Harbor, Australia. (Knapp-USGS)
W74-09893

A PARTIAL AREA MODEL FOR STORM FLOW SYNTHESIS,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
For primary bibliographic entry see Field 2A.
W74-09907

EFFECT OF SKEWNESS IN THREE STOCHASTIC PENTAD RIVER FLOW MODELS ON CROSSING PROPERTIES OF SYNTHESIZED DATA,
Birmingham Univ. (England). Dept. of Civil Engineering.
N. T. Kottegoda.
Water Resources Research, Vol 10, No 3, p 446-456, June 1974. 10 fig, 3 tab, 27 ref.

Descriptors: *Synthesis hydrology, *Statistical models, Stochastic processes, Statistical methods, Simulation analysis, Regression analysis, Floods, Droughts, Frequency analysis.
Identifiers: *Wye River(England).

Large samples were synthesized through autoregressive, fast fractional noise, and broken line models, based on a practically significant pentad time unit. The method was tested on four stations in the British Wye catchment. Hydrologic characteristics such as the numbers, durations, and magnitudes of droughts and floods were assessed by means of the crossing properties at critical levels in the time series. If a Gaussian distribution is applied to the stochastic component, crossing properties other than surplus run lengths are unrealistic. Compatibility with historical properties is achieved by the incorporation of approximately twice the coefficient of skewness estimated from the original data through a transformation to a gamma function. Also there is agreement in serial correlograms and coefficients of skewness. In this way neither negative numbers nor outliers are generated through autoregressive models. Run lengths at extreme levels in data from all models need adjustment, and a closer fitting distribution function is desirable. (Knapp-USGS)
W74-09909

SURFACE WATER NETWORK DESIGN BY REGRESSION ANALYSIS SIMULATION,
Geological Survey, Reston, Va. Water Resources Div.
M. E. Moss, and M. R. Karlinger.
Water Resources Research, Vol 10, No 3, p 427-433, June 1974. 7 fig, 1 tab, 5 ref.

Descriptors: *Streamflow forecasting, *Regression analysis, *Simulation analysis, *Network design, *Water transfer, Water supply, Statistical models, Inter-basin transfers, Water resources development, Planning, Water management(Applied).
Identifiers: *Regionalization.

Statistical characteristics of the accuracy of regression analyses as used in surface water regionalization were investigated by simulating logarithmic regressions of the streamflow parameters, mean and standard deviation, derived from synthetic streamflow sequences. Accuracy was measured in terms of equivalent years of at-site record. A procedure for design of surface water data networks that accounts for the statistical nature of estimates of parameter accuracy is presented. (Knapp-USGS)
W74-09912

SOME ASPECTS OF AQUATIC INSECT POPULATIONS OF POOLS AND RIFFLES IN GRAVEL BED STREAMS IN WESTERN UNITED STATES,
Geological Survey, Doraville, Ga.
B. W. Lium.
Journal of Research of the U S Geological Survey, Vol 2, No 3, p 379-384, May-June 1974. 3 fig, 4 tab, 8 ref.

Descriptors: *Alluvial channels, *Aquatic insects, *Particle size, Gravels, Water quality, Water pollution effects, Sampling.

Relationships were studied between aquatic-insect populations on rocks of different sizes and variations of populations between different stream localities. All aquatic insects were counted and identified on streambed gravels and cobbles chosen at random from four rivers on three to four types of locations ranging from riffles to pools. The measurements used span 3 to 4 months in 1 year. Insect density (number of insects per unit of rock area) is a function of rock size. Highest insect densities occur on rocks between 45 and 90 mm mean diameter, with larger and smaller rocks having lower insect densities. The insect population differs significantly with location within a stream; that is, from pool to riffle, as well as by stream and season. (Knapp-USGS)
W74-09919

AIRCRAFT MEASUREMENT OF SEA-WAVE PARAMETERS BY THE RADIO-ENGINEERING METHOD (IZMERENIYE PARAMETROV MORSKOGO VOLNENIYA RADIOTEKHNICHESKIM METODOM S LETATEL'NOGO APPARATA),
Taganrogskii Radiotekhnicheskii Institut (USSR).
For primary bibliographic entry see Field 7B.
W74-09933

MOVEMENT OF DEEP WATER IN THE WESTERN BOUNDARY REGION OF THE TROPICAL ATLANTIC (O DVIZHENII GLUBINNYKH VOD V ZAPADNOY POGRANICHNOY OBLASTI TROPICHESKOY ATLANTIKI),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
K. A. Chekotillo.
Akademiya Nauk SSSR Doklady, Vol 210, No 3, p 588-590, 1973. 1 fig, 8 ref.

Descriptors: *Atlantic Ocean, *Deep water, *Ocean currents, *Ocean circulation, Movement, Velocity, Flow rates, Temperature, Salinity, Depth, Profiles.
Identifiers: USSR, *Boundary currents, Countercurrents.

A gigantic system of water transport exists at great depths in the Atlantic Ocean. This system can be represented in the form of two currents at different depths. The upper current flows southwestward from the region of the Straits of Gibraltar toward the central part of the ocean. The lower current originates in Arctic Seas and flows southward. These currents transport North Atlantic Deep Water, the upper layers of which exhibit high salinity and a higher temperature, while the lower layers have a high oxygen content. Analysis of the distribution of current velocity in vertical profiles off South America indicates the existence, at depths of 1,000 to 3,000 m, of a strong current, which transports North Atlantic Deep Water along the South American continent from the Northern to the Southern Hemisphere. (Josefson-USGS)
W74-09937

DYNAMIC STRUCTURE OF THE REGION OF THE ANTILLES-GUYANA COUNTERCURRENT (DINAMICHESKAYA STRUKTURA RAYONA ANTILO-GVIANSKOGO PROTIVOTECHENIYA),
Akademiya Nauk SSSR, Moscow. Istitut Okeanologii.
V. G. Kort, V. A. Bubnov, A. B. Zubin, and K. V. Moroshkin.
Akademiya Nauk SSSR Doklady, Vol 207, No 6, p 1456-1459, 1972. 3 fig, 3 ref.

Descriptors: *Oceanography, *Ocean currents, *Ocean circulation, *Atlantic Ocean, *Surveys, Temperature, Salinity, Velocity, Flow, Maps, Curves.
Identifiers: USSR, *Antilles-Guyana countercurrent, *Boundary currents, Isolines.

Studies made during the 5th voyage of the Soviet research vessel Akademik Kurchatov (February-May 1969) have greatly modified existing theories on the structure of boundary currents in the western part of the North Atlantic. Between February and May 1972 the P. P. Shirshov Institute of Oceanology of the USSR Academy of Sciences undertook an oceanographic expedition (12th voyage of the Akademik Kurchatov) in the western part of the North Atlantic to study the area of origin of the Antilles-Guyana countercurrent and to explore the large-scale space-time variability of western boundary currents. Eight oceanographic traverses were made in the region east of the Antilles Island chain. The average distance between stations on the traverses was 30 nautical miles. Temperture and salinity data for all traverses were used to calculate currents in a geostrophic approximation and to construct dynamic profiles and maps. The zone of western boundary currents exhibits high dynamic instability and perturbations of different scales. The entire system of western boundary currents in the region is clearly identifiable: the Antilles current, the Antilles-Guyana countercurrent, and the left periphery of the Northern Trade Wind current. In the region of its origin, the Antilles-Guyana countercurrent has a width of about 100 miles, a maximum velocity of over 50 cm/sec and a depth of more than 1,000 m. On the basis of repeated observations on traverses northeast of Mayaguana (February 1969 and April 1972) and Guadeloupe (February 1969, December 1970, and March 1972), the dynamic structure of western boundary currents, including the Antilles-Guyana countercurrent, was found to be quasi-stationary, though year-to-year changes in the position of the current lines, velocities, and widths were observed. (Josefson-USGS)
W74-09938

THE PHYSICS OF AIR-SEA INTERACTION,
S. A. Kitaigorodskii.
Available from NTIS, Springfield, Va. 22151 TT72-50062. Price $3.00 printed copy; $1.45 microfiche. Israel Program for Scientific Translations Technical Translation 72-50062, Jerusalem, 1973. 238 p. (Translation of Fizika vzaimodeistviya atmosfery i okeana; Gidrometeoizdat, Leningrad, 1970.)

Descriptors: *Air-water interfaces, *Atmosphere, *Oceans, *Oceanography, *Physics, Energy, Ocean waves, Frequency, Turbulence, Turbulent boundary layers, Mixing, Winds, Drag, Roughness(Hydraulic), Velocity, Temperature, Evaporation, Stratification, Thermocline, Equations.
Identifiers: USSR, Heat exchange.

Physical investigations were made of smallscale interaction between the ocean and atmosphere. Problems of heat exchange computation and modern concepts of wave formation are discussed, and fundamentals of the theory and procedure of computation of wind-induced vertical mixing processes in the surface layer of the sea are described. Experimental data are analyzed and summarized. (Josefson-USGS)

W74-09939

FLOOD PLAIN INFORMATION, OHIO RIVER: MONROE COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09965

FLOOD PLAIN INFORMATION, OHIO RIVER: JEFFERSON COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09966

FLOOD PLAIN INFORMATION, MONONGAHELA RIVER: NORTH CHARLEROI, CHARLEROI, SPEERS, DUNLEVY, ALLENPORT, STOCKDALE, ROSCOE, AND ELCO, WASHINGTON COUNTY, PENNSYLVANIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09967

FLOOD PLAIN INFORMATION, OHIO RIVER: BELMONT COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09968

FLOOD PLAIN INFORMATION, OHIO RIVER: WETZEL COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09969

FLOOD PLAIN INFORMATION, OHIO RIVER: MARSHALL COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09970

FLOOD PLAIN INFORMATION, OHIO RIVER: HANCOCK COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09971

FLOOD PLAIN INFORMATION, OHIO RIVER: COLUMBIANA COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09972

MORPHOGENETIC STUDY OF TERMINAL TRIANGULAR TRACT OF INLAND STREAMS IN SUTLEJ YAMUNA PLAIN,
Punjab Univ., Chandigarh (India).
A. B. Mukerji.
Indian Journal of Power and River Valley Development, Vol 23, No 10, p 314-324, October, 1973. 3 fig, 3 tab, 2 ref.

Descriptors: *Streams, *Geomophology, Plains, Deltas, Landscape, Terrain analysis, Channels, Rivers, Topography, Topography, Investigations, Field investigations, Inland streams, *Channel morphology.
Identifiers: Multifurcation, Divergence, *India(Sutlej-Yamuna plain).

The purpose was to identify and describe a unit feature termed terminal triangular tract. This is a geomorphic landscape unit characterized by its triangular deltaic shape formed by a dichotomic pattern of distributaries and which is evolved as a consequence of multi-furcation of the main channel. Also shown is an empirical genetic interpretation in terms of the geometry of distributary network, surface material, terrain attributes, human interference, and local topographic details. Based on field investigations, aerial photographs and topographical sheets, the Sutlej-Yamuna plains are described. The size of the feature is correlated with the size and discharge of the stream, the angle of divergence, frequency of divergence and number of lower order distributaries. The texture of topography is finer near the points of divergence and becomes coarser away from them. The network tends to become progressively more elaborate and complicated through time. (Prague-FIRL)
W74-10052

STABILITY OF LAMINAR FLOW AT SEABED,
Cambridge Univ. (England). Dept. of Engineering.
J. F. A. Sleath.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers Vol 100, No WW2, Paper 10512, p 105-122, May 1974. 10 fig, 13 ref, append.

Descriptors: *Laminar flow, *Ocean currents, *Turbulence, Coastal engineering, Currents(Water), Hydrodynamics, Oceanography, Waves(Water), Ocean waves, *Boundary layers, *Reynolds number.

The flow produced by water waves in the laminar boundary layer above a two-dimensional rough bed was studied analytically. At low Reynolds numbers the fluid drifts in closed recirculating cells, without dispersion. At high Reynolds numbers, vortex formation occurs for large-scale roughness and sudden jets of fluid are produced at a certain point in each half-wave cycle with small-scale roughness. In both cases there is vigorous mixing close to the bed. The similarity between this mixing and that described as turbulence suggests that the results of this study may be applied to the problem of transition in oscillatory boundary layers. (Knapp-USGS)
W74-10220

RELATION OF SEASONAL DISTRIBUTION OF RUNOFF TO FLUCTUATIONS IN ANNUAL DISCHARGE (OBUSLOVLENNOST' VNUTRIGODOVOGO RASPREDELENIYA STOKA KOLEBANIYAMI VODNOSTI GODA),
Moscow State Univ. (USSR).
V. D. Bykov, and V. N. Busarov.
Vodnyye Resursy, No 2, p 191-194, 1974. 1 fig, 1 tab, 11 ref.

Descriptors: *Runoff, *Discharge(Water), *Annual, *Seasonal, *Fluctuations, Variability, Frequency, Correlation analysis.
Identifiers: USSR, Spectral analysis.

To study the relation of seasonal distribution of runoff to total annual discharge, the index of coherence was used. This index was based on estimates of the mutual correlation of the processes examined. Fluctuations in the parameters of seasonal variability of runoff were determined by fluctuations in annual discharge. On rivers with a small variability of annual runoff, a close relation between processes is typical of a wide range of frequencies (from 2-3 to 11-12 years). On rivers with a variation in annual runoff greater than 0.4, fluctuations in the parameters of seasonal distribution of runoff are dependent on fluctuations in annual discharge only in the low-frequency region. (Josefson-USGS)
W74-10222

THE EFFECT OF TOPOGRAPHY AND WATER EROSION ON RUNOFF (VLIYANIYE REL'YEFA I VODNOY EROZII NA STOK),
Odessa State Univ. (USSR).
For primary bibliographic entry see Field 2J.
W74-10228

SYSTEMS OF A WIND-WAVE FIELD (SISTEMY POLYA VETROVYKH VOLN),
Gosudarstvennyi Proektno-Izyskatelskii i Nauchno-Issledovatelskii Institut Morskogo Transporta 'Soyuzmorniiproekt', Moscow (USSR).
Yu. M. Krylov, V. V. Kuznetsov, and S. S. Strekalov.
Akademiya Nauk SSSR Doklady, Vol 208, No 4, p 958-961, 1973. 2 fig, 19 ref.

Descriptors: *Oceanography, *Waves(Water), *Gravity waves, *Winds, *Velocity, Wind velocity, Resonance, Wavelengths, Frequency, Laboratories, Lakes, Reservoirs, Oceans.
Identifiers: USSR, *Wind waves.

Based on measurements in deep natural and artificial bodies of water, two fundamental and basically different systems of gravity waves were found to develop regularly under steady wind. Under natural conditions, this phenomenon is manifested very clearly in reservoirs at small distances from shore under weak offshore winds, when wavelengths of the two fundamental systems differ by several fold, and there is virtually no disturbance from neighboring waters. The system with a phase velocity equal to wind velocity is referred to as the resonant system and that with a lesser velocity, the subresonant system. Phase velocity of the resonant system is equal to wind velocity, while that of the subresonant system increases rapidly with distance from the shore and reaches a limit approximately equal to 0.8 of wind velocity. The subresonant system reaches energy saturation comparatively rapidly, while the resonant system continues to develop. In addition to the two main systems, a third, supraresonant system with a phase velocity greater than wind velocity also develops. The physical cause of development of this system is the nonlinear interaction between the two main systems. The subresonant system predominates in the laboratory and on lakes and reservoirs; the resonant and subresonant systems dominate in seas; and the supraresonant, resonant, and subresonant systems in oceans. (Josefson-USGS)
W74-10258

DETERMINATION OF HEAT AND WATER VAPOR FLOWS IN THE OCEAN-ATMOSPHERE SYSTEM BASED ON DATA OF OBSERVATIONS OF TEMPERATURE PROFILES IN A THIN SURFACE LAYER OF THE SEA (K VOPROSU OPREDELENIYA POTOKOV TEPLA I VODYANOGO PARA V SISTEME OKEAN-ATMOSFERA PO DANNYM NABLYUDENIY PROFILEY TEMPERATURY V TONKOM POVERKHNOSTNOM SLOYE MORYA),
Moscow State Univ. (USSR).
G. G. Khundzhua, and Ye. G. Andreyev.
Akademiya Nauk SSSR Doklady, Vol 208, No 4, p 841-843, 1973. 1 fig, 13 ref.

Descriptors: *Air-water interfaces, *Water vapor, *Heat flow, *Temperature, *Profiles, Surfaces, Boundary layers, Thermal conductivity, Thermal stratification, Thermocline.
Identifiers: *USSR(Black Sea), Heat exchange, Mass exchange.

The problem of determining heat and mass exchange in the ocean-atmosphere system is reduced to a determination of temperature gradients in a thin surface layer of the sea. Full-scale observations were conducted during the summer and autumn of 1969-71 aboard the Soviet research vessel Moskovskiy Universitet on the Black Sea at points 30 miles from shore. A series of daily recordings of temperature profiles in the surface layer were obtained. A thin, cold time-stable film with a thickness of 0.002 to 0.005 m and a 2 to 3 deg C temperature drop exists in the surface layer both in a daytime and at night. The cold surface film was recorded up to sea states of 3. Calculation of selected temperature profiles for the

Black Sea in August gives a latent heat flux density of the order of 110 watts/sq m. Corresponding evaporation rates in August average 0.3 cm/day. (Josefson-USGS)
W74-10259

VERTICAL MESO- AND MICROSTRUCTURE OF OCEAN CURRENTS (O VERTIKAL'NOY MEZO- I MIKROSTRUKTURE OKEANICHESKIKH TECHENIY),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
A. S. Monin, K. N. Fedorov, and V. P. Shevtsov.
Akademiya Nauk SSSR Doklady, Vol 208, No 4, p 833-836, 1973. 3 fig, 9 ref.

Descriptors: *Geophysics, *Oceanography, *Ocean currents, *Current meters, Velocity, *Flow measurement, Profiles, Thermodynamics, Measurement, *Pacific Ocean.
Identifiers: USSR, Hodographs(Oceanography).

To measure current velocity, a new current meter was designed at the Pacific Ocean Division of the USSR Academy of Science's Institute of Oceanology. More than 30 series of simultaneous measurements were made of vertical profiles of current velocity and thermodynamic variables. The current velocity is accurate to within +0.5 cm/sec, the measurement having almost zero lag. The current direction is accurate to within +3 deg and the depth to within +0.25%. The measurement technique is promising, and the conclusions drawn, though preliminary, indicate the presence of at least a well-defined mesostructure on current-velocity vertical profiles and of a relation of mesostructure to vertical inhomogeneities of thermodynamic parameters. (Josefson-USGS)
W74-10260

EFFECT OF EQUATORIAL ROSSBY WAVES ON STATIONARY CURRENTS (O VLIYANII EKVATORIAL'NYKH VOLN ROSSBI NA STATSIONARNYYE TECHENIYA),
Akademiya Nauk URSR, Sevastopol. Marine Hydrophysics Inst.
D. U. Vapnyar.
Akademiya Nauk SSSR Doklady, Vol 208, No 4, p 829-832, 1973. 1 fig, 6 ref.

Descriptors: *Geophysics, *Oceanography, *Waves(Water), *Currents(Water), *Winds, Hydrodynamics, Equations.
Identifiers: USSR, *Rossby waves.

The problem of calculating equatorial Rossby waves generated by a periodic wind and of equatorial stationary currents which are a secondary effect of purely periodic wind is considered. Equatorial stationary currents generated by a periodic wind may be significant even at small-amplitude tangential wind stresses and exhibit a number of features characteristic of Cromwell and Lomonosov currents. Distribution of the zonal velocity component of a stationary current in a cross section intersecting the equator is diagrammed. (Josefson-USGS)
W74-10261

SOME PATTERNS OF VARIATIONS IN AVERAGE MONTHLY RIVER AND GROUNDWATER LEVELS IN THE PRIPYAT' POLES'YE REGION (NEKOTORYYE ZAKONOMERNOSTI IZMENENIYA SREDNEMESYACHNYKH UROVNEY REK I PODZEMNYKH VOD NA TERRITORII PRIPYATSKOGO POLES'YA),
For primary bibliographic entry see Field 4A.
W74-10263

WATER RESOURCES DATA FOR TEXAS, 1973: PART 1. SURFACE-WATER RECORDS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-10268

EVOLUTION OF THE SON DRAINAGE,
Saugar Univ. (India). Centre of Advanced Study in Geology.
For primary bibliographic entry see Field 2J.
W74-10285

2F. Groundwater

THE TRANSMISSIVITY ITERATIVE PROGRAMS ON THE PDP-9 COMPUTER - A MAN-MACHINE INTERACTIVE SYSTEM,
Battelle-Pacific Northwest Labs., Richland, Wash. Mathematics Dept.
L. E. Addison, D. R. Friedrichs, and K. L. Kipp.
Avail: NTIS, Springfield, Va., as Rept. No. BNWL-1707, $5.45/copy, $1.45/microfiche. Report No. BNWL-1707, 1973. 67 p, 14 fig, 4 tab, 14 ref, 4 append.

Descriptors: *Transmissivity, *Groundwater movement, *Base flow, *Model studies, *Systems analysis, Analytical techniques, Computer program, Movement.

A system of computer programs, The Transmissive Iterative Sequence, has been written with the purpose of providing an analytical aid in the simulation of groundwater flow. This man-machine interactive system directly involves the user making decisions in the analysis loop. Because of the limited amount of data available, this analysis loop is highly iterative in nature and its success depends on the ability to rapidly input and output information in a form directly related to the groundwater system being analyzed. The Iterative Sequence provides these analytical capabilities in a self-contained computer package which constitutes a useful tool for modeling a groundwater system. (Houser-ORNL)
W74-09825

STOCHASTIC ANALYSIS OF PHREATIC AQUIFERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
L. W. Gelhar.
Water Resources Research, Vol 10, No 3, p 539-545, June 1974. 6 fig, 19 ref.

Descriptors: *Surface-groundwater relationships, *Statistical models, *Stochastic processes, Alluvial channels, Recharge, Discharge(Water), Water table, Water level fluctuations.
Identifiers: *Phreatic aquifers.

Three analytical models were developed to describe the spectral response characteristics of phreatic aquifers subject to time variable accretion and fluctuations in adjacent stream stage. A linear reservoir model approximates the behavior of a more complete distributed linear model based on the Dupuit approximation if a single parameter is adjusted appropriately. A linearized two-dimensional analysis including the effects of vertical flow shows, under conditions of large anisotropy with relatively narrow partially penetrating streams, differences from the Dupuit analysis that may be important under some field conditions. Possible applications of the results in aquifer evaluation are suggested. (Knapp-USGS)
W74-09882

MATHEMATICAL SIMULATION OF THE SUBSIDENCE OF VENICE 2. RESULTS,
Centro di Ricerca IBM di Venezia (Italy).
G. Gambolati, P. Gatto, and R. A. Freeze.
Water Resources Research, Vol 10, No 3, p 563-577, June 1974. 22 fig, 6 tab, 14 ref.

Descriptors: *Subsidence, *Withdrawal, *Mathematical models, Land subsidence, Water levels, Hydrogeology, Industrial water, Artesian aquifers.
Identifiers: *Italy(Venice).

Land subsidence at Venice is the result of aquitard compaction caused by extensive groundwater withdrawals from the unconsolidated Quaternary aquifer-aquitard system that underlies the Venetian lagoon. A two-step mathematical model consisting of a regional hydrologic model and a local subsidence model was used to analyze the system. The total subsidence over the period 1930-1973 has been about 15 cm. Geodetic records, which cover only the latter portion of this period, provide documentary evidence for a 10-cm subsidence during 1952-1969. Simulations of the past used to calibrate the model show that extractions from a single large well in the Tronchetto region of Venice have exerted a small but measurable influence on the subsidence, but the main responsibility for subsidence at Venice must be placed in the heavy industrial pumpage at the mainland port of Marghera. Predictive simulations show that any changes in the withdrawal rate at Marghera will tend to propagate their effects to Venice in a relatively short time, and there will be little delay between the occurrence of head declines at Venice and the resulting subsidence. If withdrawals at Tronchetto and Marghera are kept constant in the future as they have been since 1969, about 3 cm of further subsidence can be expected. Subsidence could be arrested at its present level by a shutdown of the Tronchetto well and a reduction of Marghera pumpage to three quarters of its present value. Complete cessation of all pumping would provide a modest rebound of about 2 cm over the next 25 years. The model was limited by the requirements of radial symmetry and a calibration that was hampered by the spareness of the available data. (See also W73-10663) (Knapp-USGS)
W74-09884

THE KARSTIC GROUNDWATER BASINS OF THE KAIBAB PLATEAU, ARIZONA,
Wyoming Univ., Laramie. Dept. of Geology.
P. W. Huntoon.
Water Resources Research, Vol 10, No 3, p 579-590, June 1974. 7 fig, 4 tab, 26 ref.

Descriptors: *Karst hydrology, *Arizona, *Groundwater basins, Groundwater movement, Springs, Flow nets, Karst, Limestones, Hydrogeology.
Identifiers: *Kaibab Plateau(Ariz).

The Kaibab plateau north of the Grand Canyon is characterized by the absence of live surface streams because most of the surplus water drains through the groundwater system. Over 95% of the primary porosity that can be attributed to the 4000-ft sequence of Paleozoic sediments under the plateau occurs in the upper 900 ft of the section. However, almost all the water that discharges from the region exits through perennial karst springs developed in carbonates 3000 ft below the rims of the Grand Canyon and the Marble Canyon. The locations of these springs are fault- and joint-controlled, and they drain between 65 and 97% of the area underlying the Kaibab plateau. The relatively permeable upper Paleozoic rocks in the section collect and transmit water to fault zones where the water enters regional drains dissolved along fractures in the lower carbonates. Flow in the fault zones is largely unconfined and perched above an impermeable shale unit that underlies the lower carbonates. Consequently, the areal extent of the groundwater basins that drain the Kaibab plateau as well as potential saturated zones along the faults can be delineated by using gradients taken from a structural contour map of the top of the shale. (Knapp-USGS)
W74-09885

A DATA ACQUISITION SYSTEM FOR TRANSIENT POROUS MEDIA EXPERIMENTS IN A SECTOR TANK,
California Univ., Davis. Dept. of Water Science and Engineering.
A. Orhun, and J. N. Luthin.
Water Resources Research, Vol 10, No 3, p 601-604, June 1974. 6 fig, 1 ref.

Descriptors: *Unsteady flow, *Groundwater movement, Data collections, Permeameters, Porous media, Hydraulic models, Piezometers, Data processing.

A simple, fast, and reliable data acquisition system was designed to study groundwater flow problems under transient conditions. The data needed include soil water pressure at various locations and the outflow from the well. A sector tank was constructed for the experimental verification of the computer solutions. The grid of pressure tap points was chosen in such a way that interpolations for the equipotentials deviating from vertical lines could easily be made along the diagonals of the network. All the pressure measurements were made by piezometers constructed from 1/4-inch stainless steel tubings. (Knapp-USGS)
W74-09887

SENSITIVITY ANALYSIS OF INPUT PARAMETERS IN NUMERICAL MODELING OF STEADY STATE REGIONAL GROUNDWATER FLOW,
Geulph Univ., (Ontario). Dept. of Land Resource Science.
R. W. Gillham, and R. N. Farvolden.
Water Resources Research, Vol 10, No 3, p 529-538, June 1974. 9 fig, 15 ref.

Descriptors: *Numerical analysis, *Groundwater movement, *Groundwater basins, Mathematical models, Finite element analysis, Hydraulic conductivity.
Identifiers: *Sensitivity analysis.

To study regional groundwater flow, a finite element model was used to examine the sensitivity of computed hydraulic head values to changes in the hydraulic conductivity. Steady state saturated flow in non-uniform anisotropic cross sections was considered. The sensitivity analysis procedure was useful in locating those areas of the flow system most sensitive to changes in conductivity and in determining those components of conductivity that have the greatest effect on the hydraulic head distribution. Consequently, a sensitivity analysis is very useful in designing efficient hydraulic conductivity measurement programs. One method that has frequently been used to determine conductivities is to adjust the conductivity components in a numerical model until the computed head value agree with field measurements; this procedure could lead to erroneous conclusions. By using sensitivity analyses, a method was developed for determining the quantitative value of ratios of conductivity components from field measurements of hydraulic head. In principle, the number of head measurements must be equal to the number of unknown conductivity ratios. (Knapp-USGS)
W74-09900

A CONCEPTUAL MODEL OF HYSTERESIS,
Technion - Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W74-09902

GEOCHEMICAL INDICATORS OF SUBSURFACE TEMPERATURE--PART 1, BASIC ASSUMPTIONS,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2K.
W74-09914

GEOCHEMICAL INDICATORS OF SUBSURFACE TEMPERATURE--PART 2, ESTIMATION OF TEMPERATURE AND FRACTION OF HOT WATER MIXED WITH COLD WATER,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2K.
W74-09915

THE CALCULATION OF AQUIFER CHEMISTRY IN HOT-WATER GEOTHERMAL SYSTEMS,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2K.
W74-09916

OCCURRENCE OF DISSOLVED ORGANIC CARBON IN SELECTED GROUND-WATER SAMPLES IN THE UNITED STATES,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5B.
W74-09917

GROUNDWATER OF SIBERIA AND SOVIET FAR EAST (PODZEMNYYE VODY SIBIRI I DAL'NEGO VOSTOKA),
A. A. Dzyuba, and Ye. V. Pinneker.
Akademiya Nauk SSSR Vestnik, No 3, p 105-106, March 1974.

Descriptors: *Conferences, *Groundwater, Hydrogeology.
Identifiers: *USSR(Siberia), Soviet Far East.

The Seventh Conference on Groundwater of Siberia and Soviet Far East was held at Novosibirsk, September 24-28, 1973. The conference was sponsored by the Commission on the Study of Groundwater of Siberia and Soviet Far East, Institutes of the Earth's Crust and Hydrodynamics of the Siberian Division of the USSR Academy of Sciences, and by the Novosibirsk Geological Administration. Participants in the conference included representatives of institutes of the USSR Academy of Sciences and of the Siberian Division of the USSR Academy of Sciences, geological administrations in eastern regions of the country, research institutes of a number of Union republics, ministries, and departments, and of higher educational establishments. A total of 220 delegates attended the conference and 68 papers were presented. Discussions focused on theoretical problems of modern hydrogeology associated with basic trends in its development, formation and composition of groundwater, and with the hydrologic cycle. The importance of measures to protect groundwater from depletion and contamination was noted, and considerable attention was given to artificial groundwater replenishment. Development of methods to control natural-water resources in Siberia and Soviet Far East was stressed. Applied problems included use of fresh groundwater for water supply, inundation of oil fields and mines, land reclamation, and application of mineral waters for therapeutic purposes. (Josefson-USGS)
W74-09936

LONG ISLAND WATER,
H. Lang.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 211-236, 1973. 2 fig, 5 tab, 29 ref, 2 append.

Descriptors: Groundwater, *Groundwater availability, Groundwater resources, *Groundwater recharge, *Water supply development, Desalinations, Water pollution treatment, Cost comparisons, Projections, *New York, Hydrologic systems, Water demand, Nitrates, Correlation analysis, Wells.
Identifiers: *Long Island(N.Y.), *Nassau County(N.Y.), Suffolk County(N.Y.), 1980 water quality projections.

Nassau and Suffolk Counties derive their water supply from the large groundwater reservoir beneath Long Island. Although close geographically, the two counties have very dissimilar water problems. Highly sewered Nassau County faces a diminishing water supply, whereas Suffolk County, relying heavily on cesspools, has water quality problems. Two aquifers supply the area. The uppermost or glacial aquifer is large and readily accessible. Below it, the Magothy Aquifer is even larger and provides 80% of the Long Island groundwater supply. The most significant source of contamination originates in cesspool leaching of detergent additives and nitrates, however this problem is only prevalent in Suffolk County, where only 4% of the residences are sewered. As a result certain detergents have been banned by the Suffolk County Legislature. An estimate of the rainfall over the area yields 800 plus or minus 200 MGD as the amount of precipitation that will replenish the ground water supply. Correlating population with amount of withdrawal for Nassau and Suffolk Counties illustrates that Nassau County will exceed its safe yield of 170 MGD by 1979, mainly due to the loss in recharge capabilities as cesspolls are replaced by sewer systems. Of the various options for developing new water supply, the recharging of the groundwater aquifers with quaternary treated effluent appears to have decided advantages over desalination, or buying from surrounding areas like New York City which are already seedking their own new sources. Suffolk County should have no problem with water supply for many years to come. (See also W74-09964) (LaPointe-North Carolina)
W74-09961

SIMULATION OF ALLUVIAL FAN DEPOSITION BY A RANDOM WALK MODEL,
Geological Survey, Reston, Va. Water Resources Div.
W. E. Price, Jr.
Water Resources Research, Vol 10, No 2, p 263-274, April, 1974. 13 fig, 34 ref.

Descriptors: *Alluvial fans, *Groundwater, Geology, Aquifers, *Model studies, Simulation analysis, Stochastic processes, Flow, Gradients, Data collection, Computer models, Geologic mapping, Maps, *Acquifer characteristics.
Identifiers: *Random walk model, Simulated flows, Digital models.

Alluvial fans are an important source of groundwater and knowledge of spatial variations in the permeability of water-bearing beds in alluvial beds to geologic processes is useful to estimate aquifer parameters. This model aids in the development of data collection systems, the estimation of aquifer parameters in undeveloped areas, better interpretation of aquifer tests, and improvement in the accuracy of test-hole correlations. The results suggest that a digital model based on a random walk may be used to simulate alluvial fan deposition. The model is in three dimensions, is dynamic in time and space, and employs two independent stochastic events: an uplift of the moutain basin contributing sediments and a storm large enough to result in fan deposition. A random walk, each step governed by the gradient and momentum of flow, determines the pattern of deposition. Results of the simulation are printed as geologic maps and sections. The general form of the simulated deposits is that of an alluvial fan, the pattern of simulated flows resembles that of real flows, and fan facies show a concentration of debris flows near the apex and a particle size decrease in water flow deposits downfan. (Prague-FIRL)
W74-10054

METHOD WITH RADIOTRACERS AND EXPERIMENTS IN HYDROCARST STRUCTURES,
Academia R. S. R., Bucharest. Institutul de Fizica Atomica.
For primary bibliographic entry see Field 5A.
W74-10108

CALCITIZATION OF EDWARDS GROUP DOLOMITES IN THE BALCONES FAULT ZONE AQUIFER, SOUTH-CENTRAL TEXAS.
California State Univ., San Diego. Dept. of Geological Sciences.
P. L. Abbott.
Geology, Vol 2, No 7, p 359-362, July 1974. 2 fig.

Descriptors: *Hydrogeology, *Karst hydrology, *Texas, *Dolomite, Limestones, Carbonate rocks, Water chemistry, Leaching, Weathering, Aquifer characteristics, Faults(Geologic).
Identifiers: *Edwards Limestone(Texas), Balcouer Fault Zone(Tex).

A high-storage cavernous aquifer is developed in the Cretaceous Edwards Limestone within the Miocene Balcones fault zone. The trend of the fault system, and that of its contained aquifer, cuts across the depositional facies of the Edwards Limestone. The Edwards Limestone west of the Fault zone and east of the downdip boundary of the main aquifer contains significantly higher percentages of dolomite than similar depositional facies within the fault zone aquifer. The large amount of groundwater with a high Ca/Mg ratio which has passed through the artesian aquifer in the Edwards Group has calcitized many of the dolomite beds. (Knapp-USGS)
W74-10208

ARTIFICIAL REPLENISHMENT OF GROUNDWATER STORAGE (OBISKUSSTVENNOM VOSPOLNENII ZAPASOV PODZEMNYKH VOD),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenerno Geologii, Moscow (USSR).
For primary bibliographic entry see Field 4B.
W74-10223

RADIOCARBON AND TRITIUM EVIDENCE FOR DIRECT RAIN RECHARGE TO GROUND WATERS IN THE NORTHERN KALAHARI,
University of the Witwatersrand Johannesburg, (South Africa). Nuclear Physics Research Unit.
B. T. Verhagen, E. Mazor, and J. P. F. Sellschop.
Nature, Vol 249, No 5458, p 643-644, June 14, 1974, 2 fig, 1 tab, 9 ref.

Descriptors: *Recharge, *Water balance, *Deserts, Africa, Sands, Infiltration, Evaporation, Tracers, Tritium, Radioactive dating, *Carbon radioisotopes, *Rainfall-runoff relationships.
Identifiers: *South Africa(Kalahari Desert).

Recharge occurs in areas of the Kalahari which are covered with sand. A controlling factor is the annual amount of precipitation, which averages 450 mm in the north, gradually decreasing to 250 mm in the south. In addition, the seasonal variability of annual rainfall with the occasional high rainfall outliers (such as the seasons of 1966-67 and 1973-74) is of extreme importance for recharge. The Kalahari, a flat and sand-covered region of more than 600,000 sq km is classified as a desert because of the virtual absence of surface waters in the form of springs or perennial rivers. Both the radiocarbon and tritium data lead to the conclusion that ground waters in the northern Kalahari are directly, and in some cases rapidly, recharged by rain. Balanced exploitation could make room for additional recharge which is partly lost to evapotranspiration from the often shallow water tables. Even at values of rainwater infiltration as low as 5% this could still constitute a significant managed ground water supply. (Knapp-USGS)
W74-10250

SOME PATTERNS OF VARIATIONS IN AVERAGE MONTHLY RIVER AND GROUNDWATER LEVELS IN THE PRIPYAT' POLES'YE REGION (NEKOTORYYE ZAKONOMERNOSTI IZMENENIYA SREDNEMESYACHNYKH UROVNEY REK I PODZEMNYKH VOD NA TERRITORII PRIPYATSKOGO POLES'YA),
For primary bibliographic entry see Field 4A.
W74-10263

ISOTOPIC AND CHEMICAL CHARACTERISTICS OF HIGH-LEVEL GROUNDWATER ON OAHU, HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 4B.
W74-10273

EFFECTS OF LANDFILL DISPOSAL OF CHEMICAL WASTES ON GROUNDWATER QUALITY,
Minnesota Univ., Minneapolis. School of Public Health.
For primary bibliographic entry see Field 5B.
W74-10278

2G. Water In Soils

INTERFACIAL INTERACTION OF WATER AND SILICATE MINERALS,
Missouri Univ., Kansas City. Dept. of Physics.
For primary bibliographic entry see Field 2K.
W74-09805

PREDICTING OPTIMUM DEPTH OF PROFILE MODIFICATION BY DEEP PLOWING FOR IMPROVING SALINE-SODIC SOILS,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
W. W. Rasmussen, and B. L. McNeal.
Soil Science Society of America Proceedings, Vol 37, No 3, p 432-437, May-June, 1973. 2 fig, 3 tab, 14 ref.

Descriptors: *Saline soils, *Deep tillage, *Hydraulic conductivity, Permeability, Soil management, Infiltration.
Identifiers: Deep plowing.

A previously developed procedure for predicting the effect of mixed-salt solutions on soil hydraulic conductivity (HC) was used to predict the relative hydraulic conductivity (RHC) of separate soil horizons from saline-sodic soils, using a standard low-salt solution following a standard high-salt solution at a fixed exchangeable-sodium level. These values were then used to predict the RHC of mixtures of the same horizons simulating profiles modified to various depths by deep plowing. Weighing RHC values for individual horizons by the depth fraction of each horizon in the soil mixture provided RHC values of proper magnitude, except when large proportions of calcareous subsolum material were incorporated into the mixture. Results were improved by multiplying calculated RHC values for each soil mixture by the initial HC of the mixture. Results were consistent with lysimeter and field plot observations on the same soils, including deep plowing trials. (Skogerboe-Colorado State)
W74-09812

EFFECT OF SURFACE DRAINAGE ON WATER TABLE RESPONSE TO RAINFALL,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
R. W. Skaggs.
Paper No 72-732 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972, Chicago, Illinois. 23 p, 10 fig, 4 tab, 15 ref.

Descriptors: *Drainage, *Surface drainage, Crop response, Soil water, *Water table, Rainfall, Soil water movement, Drainage engineering, *Loam.

A method for determining the effect of surface drainage on the water table response to rainfall is presented and used to predict water table rise on a Lumbee sandy loam. Predicted results were in good agreement with actual measurements. Approximate methods for implementing the method are presented and discussed. (Skogerboe-Colorado State)
W74-09813

DRAINAGE AND WATER MANAGEMENT IN HUNGARY,
Agricultural Research Service, Riverside, Calif.
W. W. Donnan, and G. Jaranyi.
Paper No 72-704 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972. Chicago, Illinois. 9 p, 5 ref.

Descriptors: *Drainage, *Water management(Applied), Surface drainage, Subsurface drainage, Tile drainage, Irrigation practices, Irrigation systems.
Identifiers: *Hungary.

Hungary has embarked on an ambitious program to develop it's soil and water resources. Progress to date is described with emphasis on the work in the drainage field. (Skogerboe-Colorado State)
W74-09816

DEVELOPMENT OF BI-LEVEL DRAINAGE THEORY,
South Dakota State Univ., Brookings.
For primary bibliographic entry see Field 4A.
W74-09817

LITTER AND SOIL MICROBIAL DYNAMICS IN A DECIDUOUS FOREST STAND,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-09823

MANAGEMENT OF SOLID RADIOACTIVE WASTES,
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-09874

APPROXIMATING SOIL MOISTURE CHARACTERISTICS FROM LIMITED DATA: EMPIRICAL EVIDENCE AND TENTATIVE MODEL,
Geological Survey, Denver, Colo. Water Resources Div.
I. S. McQueen, and R. F. Miller.
Water Resources Research, Vol 10, No 3, p 521-527, June 1974. 6 fig, 43 ref.

Descriptors: *Soil moisture, *Moisture content, Adsorption, Capillary action, Equations, Moisture tension, *Moisture stress.
Identifiers: Soil moisture characteristic.

The soil moisture characteristic can be approximated from limited data as a composite of segments that are simple logarithmic relations. From available data, three segments are evident: (1) a capillary segment from saturation to pF 2.5, (2) an absorbed film segment covering the stress range from about pF 2.5 to about 5.0, and (3) a tightly absorbed segment that extends from pF 5.0 to 7.0. (Knapp-USGS)
W74-09901

A CONCEPTUAL MODEL OF HYSTERESIS,
Technion - Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.
Y. Mualem.
Water Resources Research, Vol 10, No 3, p 514-520, June 1974. 12 fig, 14 ref, 1 append.

Descriptors: *Capillary action, *Hysteresis, *Soil water movement, *Wetting, *Drying, Soil moisture, Porous media, Saturated flow, Unsaturated flow, Equations, Model studies.

A conceptual model of the capillary hysteresis phenomenon is suggested. The advantage of this model is that all scanning curves are derived with the aid of simple functions from the main drying curve and the main wetting curves solely. The

model takes into account a reversible part of the process. A simple method of predicting the first drying curve and the scanning curves branched out of the first drying curve is also proposed. The model is often in more satisfactory agreement with measurements for cases in which the prediction based on the Neel-Everett model is poor. The suggested method can be used for solving problems in which hystersis plays a significant role. (Knapp-USGS)
W74-09902

THE SOIL CREEP--CURVED TREE FALLACY,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2J.
W74-09918

HEAT TRANSFER MODELS FOR A SUBSURFACE, WATER PIPE, SOIL-WARMING SYSTEM,
Arkansas Univ., Fayetteville. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W74-09921

HYDRAULIC DRAG DURING INFILTRATION OF WATER IN A SOIL VEGETATIVE LAYER (GIDRAVLICHESKIYE SOPROTIVLENIYA PRI FIL'TRATSII VODY V RASTITEL'NOM SLOYE POCHVY),
Moskovskii Inzhenerno-Stroitel nyi Institut (USSR).
A. D. Al'tshul', and Nguen Tay.
Meteorologiya i Gidrologiya, No 12, p 77-84, December 1973. 4 fig, 1 tab, 5 ref.

Descriptors: *Infiltration, *Vegetation effects, *Slopes, *Drag, *Flow resistance, Flow, Flow friction, Flow rates, Velocity, Reynolds number, Dimensional analysis, Hydraulic similitude, Model studies, Equations.
Identifiers: USSR.

Flow friction drag in a soil vegetative layer is determined by the state of slope surface, depth and velocity of flow over slopes, water temperature, and the degree to which the surface is covered with vegetation. Two typical cases of movement are considered: (1) flow of water over a slope covered with vegetation composed of rigid stalks, whose height is greater than the depth of water; and (2) flow of water over a slope covered with vegetation composed of rigid stalks, whose height is less than the depth of water. Flexibility of the plant stalks has a significant effect on the magnitude of hydraulic drag during movement of water over slopes with vegetal cover. During movement of water over these slopes, three flow regimes can occur: laminar, transitional, and turbulent. The boundary between these regimes is determined by critical values of the Reynolds number, which considers, in addition to hydraulic flow characteristics, the characteristics of the vegetal cover of the slope. Generalized formulas, obtained as a result of considering flow of water in channels lined with vegetation as an infiltration problem, were proposed for determining the drag coefficient during flow of water over slopes with vegetal cover. The similitude criterion was obtained for simulating movement of water over these slopes (the so-called flexibility criterion of the stalks) on the basis of the modulus of elasticity and moment of inertia of plant stalks and the depth and mean velocity of flow. Relationships are recommended for determining underwater height of stalks in different cases of water movement over slopes with vegetal cover. (Josefson-USGS)
W74-09931

RETENTION OF RADIONUCLIDES DEPOSITED IN THE CHALK RIVER NUCLEAR LABORATORIES WASTE MANAGEMENT AREAS,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
For primary bibliographic entry see Field 5B.
W74-10118

PERCOL USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resource Dept.
For primary bibliographic entry see Field 5B.
W74-10123

FAILURE OF 307 BASIN TRANSFER LINE AND RESULTANT GROUND CONTAMINATION,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 5B.
W74-10127

USE OF CAISSONS FOR SAMPLING CHEMICAL AND BIOLOGICAL CONDITIONS BENEATH A BEEF FEEDLOT,
Nebraska Univ., Lincoln.
For primary bibliographic entry see Field 5A.
W74-10138

AMMONIA VOLATILIZATION AND NITROGEN TRANSFORMATIONS IN HIGH PH SOILS USED FOR BEEF MANURE DISPOSAL,
Corps of Engineers, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W74-10143

A SIMILARITY DURING EARLY STAGES OF RAIN INFLITRATION,
Hawaii Univ., Honolulu. Dept. of Soil Science.
L. R. Ahuja, and M. J. M. Romkens.
Soil Science Society of America Proceedings, Vol 38, No 3, p 541-544, May-June 1974. 4 fig, 10 ref.

Descriptors: *Infiltration, *Rainfall-runoff relationships, *Wetting, Diffusivity, Irrigation, Sprinkler irrigation.

A similarity relationship exists during early stages of rain infiltration into a relatively dry soil in which the diffusivity varies exponentially with the water content. The similarity leads to simple expressions for describing the wet-front progress and the water-content change at the soil surface. The wet-front equation adequately describes the experimental data for four different soils. The approach can be extended to some cases of rainfall when the intensity is time-dependent, and to infiltration with transient surface sealing. (Knapp-USGS)
W74-10205

SOIL WATER CONTENT: MICROWAVE OVEN METHOD,
California Univ., Davis. Dept. of Water Science and Engineering.
R. J. Miller, R. B. Smith, and J. W. Biggar.
Soil Science Society of America Proceedings, Vol 38, No 3, p 535-537, May-June 1974. 2 fig, 3 tab, 6 ref.

Descriptors: *Moisture content, *Soil moisture, *Microwaves, *Drying, Laboratory tests, Gravimetric analysis, Instrumentation.
Identifiers: *Microwave ovens.

The moisture content of soils may be determined rapidly with a microwave technique. Equations are given for estimating soil drying times for two soils of different texture at different moisture contents and for different sample sizes, Drying soil by microwave oven may also be useful as a method for soil preparation prior to chemical analyses. (Knapp-USGS)
W74-10206

ARTIFICIAL WEATHERING OF OXIDIZED BIOTITE: IV. THE INHIBITORY EFFECT OF POTASSIUM ON DISSOLUTION RATE,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nturition.
R. J. Gilkes, and R. C. Young.
Soil Science Society of America Proceedings, Vol 38, No 3, p 529-532, May-June 1974. 3 fig, 1 tab, 10 ref.

Descriptors: *Weathering, *Clay minerals, *Soil chemistry, Mineralogy, X-ray diffraction, Leaching, *Potassium, Chlorides, Iron, Ion exchange.
Identifiers: Dissolution rates, *Biotites.

Rates of dissolution of oxidized biotites in 0.1M 0.01M HCl were severely depressed in the presence of 1M KCl. The amounts of Al, Mg, Mn dissolved in the first extraction were similar to those found without KCl; however, subsequent extractions removed these elements at 10-20% of the corresponding HCl rates. This effect may be due to a decreased rate of vermiculite formation, thereby reducing the effective basal area exposed to attack. A decrease in dissolution rate with increasing ferric iron content was still apparent in the presence of 1M KCl. (See also W73-06730 and W73-06731) (Knapp-USGS)
W74-10209

INFLUENCE OF ANTECEDENT SOIL MOISTURE SUCTION ON SATURATED HYDRAULIC CONDUCTIVITY OF SOILS,
Texas Agricultural Experiment Station, Weslaco.
C. J. Gerard.
Soil Science Society of America Proceedings, Vol 38, No 3, p 506-509, May-June 1974. 6 fig, 4 tab, 5 ref.

Descriptors: *Hydraulic conductivity, *Antecedent moisture content, *Soil water movement, *Moisture tension, Saturated flow, Soil gases, Carbon dioxide, Wetting.

The influence of antecedent soil moisture suction on saturated hydraulic conductivities of soils was studies. Saturated hydraulic conductivity of a soil is a dynamic property which is markedly influenced by antecedent soil moisture suction. Antecedent soil moisture of 0.33 bar suction, such as is often practiced with trickle irrigation, caused marked reduction in the ability of soil to conduct of water. Gases produced by microorganisms at low suction, their subsequent entrapment, and their influence on soil macrovoids are largely responsible for reduction in ability of soil to conduct water. Reduction of effective soil macrovids by microbial growth, flowing water, and soil moisture suction can also reduce soil permeability. Soil moisture management can influence the ability of soil to conduct water. (Knapp-USGS)
W74-10211

SOIL MOTTLING AND DRAINAGE IN A MOLLIC HAPLUDALF AS RELATED TO SUITABILITY FOR SEPTIC TANK CONSTRUCTION,
Wisconsin Univ., Madison. Coll. of Agricultural and Life Sciences.
For primary bibliographic entry see Field 5B.
W74-10212

THE EFFECT OF OVERBURDEN PRESSURE ON CHLORIDE AND WATER MOVEMENT IN SWELLING CLAY SOIL,
Texas Agricultural Experiment Station, College Station.
D. E. Kissel, and J. T. Ritchie.
Soil Science Society of America Proceedings, Vol 38, No 3, p 391-394, May-June 1974. 4 fig, 2 tab, 10 ref.

Descriptors: *Soil water movement, *Clay minerals, *Chlorides, *Expansive soils, *Membrane processes, Adsorption, Leaching, Pressure.

The influence of overburden pressure on the movement of water and Cl was tested in short undisturbed cores of swelling clay soil. When overburden pressure was removed from the cores, saturated flow rates increased. Subsequent miscible displacement studies revealed that the exclusion of Cl was also reduced. When soil cores were loaded with overburden pressure, the amount of soil water from which Cl was excluded was approximately 50%. When overburden pressure was removed, the amount of soil water from which Cl was excluded was 33%, about the same value as measured in disturbed soil cores of approximately the same water content. Differences in the quantity of soil water from which Cl was exluded between loaded and unloaded cores were due to an interaction between soil structure and the negative charge on the clay in the loaded cores. Apparently, when overburden pressure was removed, smaller pores increased in diameter, which allowed Cl to diffuse more freely into these spaces. (Knapp-USGS)
W74-10213

ON THE INTERACTION OF WATER AND HEAT TRANSPORT IN FROZEN AND UNFROZEN SOILS: I. BASIC THEORY; THE VAPOR PHASE,
Geulph Univ. (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 2C.
W74-10215

ON THE INTERACTION OF WATER AND HEAT TRANSPORT IN FROZEN AND UNFROZEN SOILS: II. THE LIQUID PHASE,
Geulph Univ. (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 2C.
W74-10216

TIME-DEPENDENT LINEARIZED INFILTRATION. I. POINT SOURCES,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
A. W. Warrick.
Soil Science Society of America Proceedings, Vol 38, No 3, p 383-386, May-June 1974. 4 fig, 12 ref.

Descriptors: *Soil water movement, *Infiltration, *Unsaturated flow, Equations, Soil moisture, Wetting, Irrigation.
Identifiers: *Trickle irrigation.

Soil water flow from a point source was analyzed using a linearized form of the moisture flow equation. Time-dependence was assumed with the results simplifying to those for steady-state conditions. Discrete time-distributed inputs such as for trickle or high frequency irrigation are amenable to solution. Numerical simulations include the advance of a wetting front during infiltration, moisture variation resulting from a cyclic input as during irrigation, and the matric flux potential field for a two-source problem. (Knapp-USGS)
W74-10217

PREDICTION OF WATER LOSS FROM A FALLOW FIELD SOIL BASED ON SOIL WATER FLOW THEORY,
Agricultural Research Service, Fort Collins, Colo.
For primary bibliographic entry see Field 2D.
W74-10218

METHODS OF CALCULATION OF EVAPORATION AND WATER REGIME IN THE ROOT ZONE OF SOIL ON WATERSHED (METODY RASCHETA ISPARENIYA I VODNOGO REZHIMA KORNEOBITAYEMOGO SLOYA POCHVY NA VODOSBORAKH),
For primary bibliographic entry see Field 2D.
W74-10227

AN ECONOMICAL HYDRAULIC LYSIMETER--CONSTRUCTION AND CALIBRATION,
Jawaharlal Nehru Agricultural Univ., Jabalpur (India). Dept. of Soil Science and Agricultural Chemistry.
R. K. Gupta.
Journal of the Indian Society of Soil Science, Vol 21, No 4, p 377-381, December 1973. 4 fig, 7 ref.

Descriptors: *Lysimeters, *Instrumentation, Equipment, Soil moisture, Soil water, Evapotranspiration, Evaporation, *Calibrations, Measurement, *Moisture meters.

A low cost hydraulically weighed lysimeter designed in India may be constructed from locally available material. The lysimeter consists of a locally fabricated hydraulic load cell as the weighing device, a coconut oil drum as the inner tank and a read out system with a provision to read weight changes in six lysimeters. The lysimeter is sensitive to 100 g (equivalent to 0.04 mm of water). The linear deflection in the water manometer recorded for the lysimeter is 20 mm per kilogram. (Knapp-USGS)
W74-10238

EFFECT OF ACIDITY ON REACTIONS OF ORGANIC ACIDS AND AMINES WITH MONTMORILLONITIC CLAY SURFACES,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-10244

FORMATION OF CLAY-PROTEIN COMPLEXES,
New Hampshire Univ., Durham.
R. D. Harter, and G. Stotzky.
Soil Science Society of America Proceedings, Vol 35, No 3, p 383-389, May-June 1971. 3 fig, 4 tab, 26 ref. OWRR A-020-NH(8), PHS Grant A1-08476-01.

Descriptors: *Adsorption, *Clay minerals, *Proteins, *Trace elements, Soil chemistry, Sodium, Nutrients, Organic matter, Organic compounds, Hydrogen ion concentration.
Identifiers: *Clay-organic complexes.

Proteins (catalase, alpha-casein, alpha-chymotrypsin, edestin, beta-lactoglobulin, lysozyme, ovalbumin, ovomucoid, and pepsin), ranging in molecular weight from approximately 17,000 to 310,000 and in isoelectric point from approximately pH 2 to 11, were adsorbed onto smectite homoionic to H, Na, Ca, Al, La, or Th. Adsorption was observed in every combination of homoionic clay and protein, even when the ambient pH of the clay suspensions (which ranged from approximately pH 3 to 7) was several units above the isoelectric point of the protein. The amount of protein adsorbed and the shapes of both the adsorption isotherms and the binding isotherms were more related to the molecular weight of the proteins and to the valency of the cations on the clay exchange complex than to the ambient pH of the clay-protein systems and the isoelectric point of the proteins. In general, the amount of adsorption was directly proportional to molecular weight of the proteins and inversely proportional to cationic valence. (Knapp-USGS)
W74-10245

ADSORPTION OF LYSOZYME AND OVALBUMIN BY CLAY: EFFECT OF CLAY SUSPENSION PH AND CLAY MINERAL TYPE,
New Hampshire Univ., Durham. Inst. of Natural and Environmental Resources.
J. T. Albert, and R. D. Harter.
Soil Science, Vol 115, No 2, p 130-136, 1973. 4 fig, 1 tab, 11 ref.

Descriptors: *Adsorption, *Clay minerals, *Proteins, Hydrogen ion concentration, Soil chemistry, Nutrients, Organic matter, Organic compounds.
Identifiers: *Clay-organic complexes, *Lysozyme, *Ovalbiumin.

Adsorption of lysozyme and ovalbumin to all clay minerals except kaolinite in influenced by clay suspension pH. In laboratory studies, the adsorption of both proteins increased as the clay suspension pH approached the protein isoelectric point. In unbuffered systems, adsorption of protein was observed at suspension pH values considerably above the protein isoelectric point. With the exception of kaolinite, adsorption of protein to sodium clays caused an observed increase in sodium ion in solution, thus indicating a cation exchante adsorption mechanism. Lysozyme apparently intercalated smectite, but in all other cases protein appeared to be adsorbed only on external sites, especially near the clay edges. (Knapp-USGS)
W74-10246

PROBLEM OF MEASUREMENT OF SOIL MOISTURE POTENTIAL BY THE CRYOSCOPIC METHOD (K VOPROSU OB IZMERENII POTENTSIALA POCHVENNOY VLAGI KRIOSKOPICHESKIM METODOM),
Moscow State Univ. (USSR).
A. D. Voronin, and V. D. Skalaban.
Meteorologiya i Gidrologiya, No 9, p 56-65, September 1973. 3 fig, 1 tab, 11 ref.

Descriptors: *Soil physics, *Soil water, *Soil moisture, *Measurement, *Thermodynamics, Entropy, Free energy, Equilibrium, Temperature, Isotherms, Freezing, Cooling, Water types, Water vapor, Vapor pressure, Isobars, Instrumentation, Hygrometry, Curves, Equations.
Identifiers: USSR, Moisture potential, *Cryoscopic method.

Theoretical and procedural problems of the cryoscopic method of measurement of soil moisture potential are discussed. The method is applicable at comparatively high moisture values, when entropy differences of soil water and free water, which cause a dependence of the potential on temperature, are very small. The method can be used with sufficient accuracy for estimation of the potential at positive temperatures. Procedural errors of many handbooks are critically reviewed. (Josefson-USGS)
W74-10265

SUBSURFACE IRRIGATION IN HAWAIIAN SUGARCANE,
Hawaiian Sugar Planters' Association Experiment Station, Honolulu.
For primary bibliographic entry see Field 3F.
W74-10326

CULTURAL PRACTICES FOR IRRIGATED WINTER WHEAT PRODUCTION,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 3F.
W74-10327

SALT TOLERANCE OF MEXICAN WHEAT: I. EFFECT OF NO3 AND NACL ON MINERAL NUTRITION, GROWTH, AND GRAIN PRODUCTION OF FOUR WHEATS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
For primary bibliographic entry see Field 3C.
W74-10328

MEASUREMENT OF THE DIFFUSION COEFFICIENT OF BORON IN SOIL USING A SINGLE CELL TECHNIQUE,
College of Agriculture, Sungei Besi (Malaysia).
For primary bibliographic entry see Field 5B.
W74-10329

NITRATE-N ACCUMULATION IN THE SOIL PROFILE UNDER ALFALFA,
Illinos Univ., Dept. of Agronomy. Urbana.
For primary bibliographic entry see Field 5B.
W74-10330

PRINCIPLES OF MANAGING HIGH FREQUENCY IRRIGATION,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3F.
W74-10331

SOIL MULCH EFFECTS ON SEEDBED TEMPERATURE AND WATER DURING FALLOW IN EASTERN WASHINGTON,
Agricultural Research Service, Pullman, Wash. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 3F.
W74-10333

PRESERVATION OF SOIL SAMPLES FOR INORGANIC NITROGEN ANALYSES,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
D. W. Nelson, and J. M. Bremner.
Agronomy Journal, Vol 64, No 2, p 196-199, March-April, 1972. 3 tab, 23 ref.

Descriptors: *Nitrates, *Inorganic compounds, *Nitrogen, Nitrogen cycle, Nitrogen fixation, Nitrogen compounds, Soil analysis, *Iowa.

Studies of the effects of several pretreatments and storage conditions on the inorganic N contents of 10 Iowa soils indicated that storage at -5 C in an airtight container is a satisfactory method of preserving field-moist soil samples for inorganic N analyses. Storage at this temperature did not cause a significant change in the exchangeable ammonium N, nitrate N, or fixed ammonium N contents of the soils studied. Air-drying at 22 C increased the inorganic N contents of most of the soils studied, with the average increase 4.2 ppm for exchangeable ammonium N, 1.7 ppm for nitrate N, and 4.4 ppm for fixed ammonium N. Oven-drying at 55 C resulted in a slightly larger increase in exchangeable ammonium N than did air-drying at 22 C, and drying at 22 C in ammonia-free air caused a smaller increase in exchangeable ammonium N than drying at the same temperature in laboratory air. Storage of air-dried soils in paper bags for 9 months led to marked increases in their inorganic N contents. (Skogerboe-Colorado State)
W74-10334

COMPARATIVE YIELD AND FERTILIZER EFFICIENCY OF NO-TILLAGE AND CONVENTIONALLY TILLED CORN,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
For primary bibliographic entry see Field 3F.
W74-10335

INFLUENCE OF SALINITY ON FE, MN, AND ZN UPTAKE BY PLANTS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3C.
W74-10336

RESPONSE OF CORN TO TIME AND RATE OF PHOSPHORUS AND ZINC APPLICATION,
West Virginia Univ., Morgantown. Div. of Plant Sciences.
For primary bibliographic entry see Field 3F.
W74-10337

RESPONSE OF IRRIGATED CORN TO TIME, RATE, AND SOURCE OF APPLIED N ON SANDY SOILS,
Wisconsin Univ., Madison. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-10338

SENSITIVITY OF SOUTHERN PEAS TO PLANT WATER DEFICIT AT THREE GROWTH STAGES,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W74-10340

BULK DENSITY OF A FRAGIPAN SOIL IN NATURAL AND DISTURBED PROFILES,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 8D.
W74-10342

NITROGEN, SALINITY, AND ACIDITY DISTRIBUTION IN AN IRRIGATED ORCHARD SOIL AS AFFECTED BY PLACEMENT OF NITROGEN FERTILIZERS,
Philippines Univ., Laguna. Coll. of Agriculture.
For primary bibliographic entry see Field 3C.
W74-10343

EFFECT OF ION-PAIR FORMATION ON THE SOLUBILITY PRODUCT,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
K. L. Babcock, and G. M. Marion.
Soil Science Society of America Proceedings, Vol 36, No 4, p 689-691, July-August, 1972. 4 ref.

Descriptors: *Ions, Ion exchange, *Solubility, *Gypsum, Soil chemistry, *Electrolytes.

Two treatments of electrolyte solutions in which ion-pair formation occurs are possible: one as a strong electrolyte, the other as a weak electrolyte. It is demonstrated, however, that the value of a solubility product is independent of the method of treatment. (Skogerboe-Colorado State)
W74-10345

QUALITY OF DRAINAGE WATER FROM A HEAVY-TEXTURED SOIL,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W74-10346

2H. Lakes

DISTRIBUTION OF TRACE METALS IN A WARM WATER RELEASE IMPOUNDMENT,
Quachita Baptist Univ., Arkadelphia, Ark.
J. Nix.
Available from the National Technical Information Service as PB-233 788 $8.25 in paper copy, $1.45 in microfiche. Completion Report, Arkansas Water Resources Research Center, Fayetteville, April 1974. 377 p, 91 fig, 43 tab, 20 ref. OWRR B-014-ARK(2), 14-01-0001-3057.

Descriptors: *Arkansas, *Impoundments, *Trace elements, *Heavy metals, *Water quality, Water temperature, Dissolved oxygen, Turbidity, Iron, Manganese, Sodium, Potassium, Calcium, Magnesium, Nitrates, Zinc, Phosphates, Sulfates, Chlorides, Fluorides, Cadmium, Alkalinity, Copper cobalt, Nickel, Lead, Chemical oxygen demand, Hydrogen ion concentration, Path of pollutants, Distribution patterns.
Identifiers: *DeGray Reservoir(Ark), Silver.

A water quality study of the DeGray Reservoir, Arkansas, was conducted following the beginning of impoundment through the first year the reservoir was operated near normal poll elevation. This reservoir is the first major dam in Arkansas with upper level release capabilities. Temperature, dissolved oxygen, and turbidity were measured in situ over the old river channel. Samples from each station were analyzed for: pH, sodium, potassium, calcium, magnesium, nitrate, phosphate, sulfate, chloride, fluoride, alkalinity, COD, iron, manganese, copper, cobalt, nickel, lead, zinc, cadmium, and silver. Heavy metals were determined in both the particulate fraction (retained by a 0.45 micron filter) and the soluble fraction (passed by a 0.45 micron filter). Density currents, laden with silt were observed near the top of the thermocline and apparently are the origin of metalimnic dissolved oxygen minimum. The total quantity of both iron and manganese was found to cycle in response to oxygen depletion in the hypolimnion; it was difficult to determine if seasonal fluctuation of these metals was occuring. Temperature regimen in the river is similar to that present befor impoundment.
W74-09801

THE MIXING PATTERNS OF THE JORDAN RIVER IN LAKE KINNERET,
Kinneret Limnology Lab., Tiberias (Israel).
S. Serruya.
Limnology and Oceanography, Vol 19, No 2, p 175-181, March 1974. 8 fig, 2 tab, 6 ref.

Descriptors: *Mixing, *Lakes, *Density stratification, *Path of pollutants, Saline waters, Nutrients, Salinity, Turbidity, Seasonal, Water quality.
Identifiers: *Israel(Lake Kinneret).

The major flow of the Jordan River into Lake Kinneret is during winter. At the beginning of the floods, the river water flows southward directly on the bottom of the lake. In late winter or spring, the river water is deflected toward the western shore and mixes rapidly in the upper layers of the lake. These patterns are explained on the basis of density changes due to variations of temperature, salinity, and suspended material. (Knapp-USGS)
W74-09890

DETERMINATION OF LABILE AND STRONGLY BOUND METALS IN LAKE WATER,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W74-09896

LAKE MICHIGAN,
For primary bibliographic entry see Field 5C.
W74-09953

LAKE ERIE,
For primary bibliographic entry see Field 5C.
W74-09954

FLOODING PROBLEMS ASSOCIATED WITH CURRENT HIGH LEVELS OF THE GREAT LAKES.
Michigan Dept. of Natural Resources, Lansing. Water Development Services Div.
December, 1973. 47 p, 19 tab, 22 photo, 5 map, fig.

Descriptors: *Flood control, *Flood damage, *Flood protection, *Michigan, *Great Lakes, Lakes, Flood plain insurance, Flood plains, Flood forecasting, Non-structural alternatives, Insurance, Shore protection, Planning, Investigations, Water resources development, Flood plain zoning, Water levels.
Identifiers: National Flood Insurance Act.

A summary is presented of an investigation of flood problems associated with the current high levels of the Great Lakes. A compilation of damage estimates and possible alternative courses of future action in this area are included. In addition to examining the reasons for the high wa

level, the effects on navigation, physical property damage and fish and wildlife populations are discussed. This is followed by an examination of what can be done under existing state and federal programs. The possibility of relief by construction of a series of controls is dismissed as too costly, exceeding the value of what is to be protected. The 1968 National Flood Insurance Act is discussed as well as the Flood Disaster Protection Act of 1973. Alternatives are suggested for future action such as amending the Shorelands Protection Act to require identification of flood hazard areas so that community and state agencies are able to regulate future land use. (Gragg-Florida)
W74-09994

NOVEMBER 1972 FLOODS ON THE LOWER GREAT LAKES,
Windsor Univ., (Ontario). Dept. of Geography.
A. J. Brazel, and D. W. Phillips.
Weatherwise, Vol 27, No 2, p 56-62, April, 1974. 6 fig, 2 tab, 7 ref.

Descriptors: *Flooding, *Flood damage, *Flood forecasting, *Great Lakes Region, Flood waves, Sewer systems, Costs, Investigation, Forecasting, Agriculture, Geomorphology, Meteorology, *Canada, *Lake Erie.
Identifiers: *Lake St. Clair, Toronto(Canada).

Public and political outcry was noted in 1972 due to high water levels on the Great Lakes. Extensive flood damage had occurred for which individuals, industries, and governments were blamed. This study gives a meteorological analysis of the flooding, wave action, wind set-up and seiche, both over time and for various portions of specific lakes. Shoreline damage and structural weakening of shorefront structures, geomorphological damage, harmful effects to wildlife, agriculture, and sewer systems cannot be measured in costs, although measurable damage amounted to over twenty-five million dollars. The result of this investigation was the establishment of a Lake Level Advisory and Warning Service in Toronto in 1973. This forecasts wave heights and potential inundation levels along the Lake Erie and Lake St. Clair shorelines. (Prague-FIRL)
W74-10050

MATHEMATICAL MODEL OF THE BIOTIC CIRCULATION WITHIN THE LAKE ECOSYSTEM, (IN RUSSIAN),
Akademiya Nauk SSR, Leningrad. Institut Evolyutsionnoi Fiziologii i Biokhimii.
For primary bibliographic entry see Field 5C.
W74-10126

TEMPERATURE REGIME OF DEEP WATER BODIES DURING SPRING AND SUMMER HEATING (TEMPERATURNYY REZHIM GLUBOKIKH VODOYEMOV V PERIOD VESENNE-LETNEGO NAGREVA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
M. P. Vadkovskaya.
Vodnyye Resursy, No 2, p 88-96, 1974. 20 ref.

Descriptors: *Bodies of water, *Deep water, *Temperature, *Heating, *Seasonal, Spring, Summer, Heat transfer, Thermal conductivity, Convection, Thermal stratification, Thermocline, Lakes, Reservoirs, Equations.
Identifiers: *USSR.

Basic data in the Soviet and foreign literature on heat transfer in deep reservoirs and lakes during spring and summer heating are reviewed. Possible mechanisms of heat transfer at different stages of heating, and ways of approaching their theoretical interpretation are examined. Attention is directed to factors affecting the degree and intensity of heating of water bodies and their water temperature at different stages of heating. (Josefson-USGS)
W74-10226

RELATION OF FLUCTUATIONS IN LEVELS OF THE CASPIAN AND ARAL SEAS (O SVYAZI KOLEBANIY UROVNEY KASPIYSKOGO I ARAL'SKOGO MOREY),
Moscow State Univ. (USSR).
S. A. Mayeva, A. N. Kosarev, and Ye. G. Mayev.
Vodnyye Resursy, No 2, p 41-48, 1974. 2 fig, 18 ref.

Descriptors: *Lakes, *Water levels, *Water level fluctuations, Variability, Moisture, Streamflow, Runoff, Climates.
Identifiers: *USSR, *Caspian Sea, *Aral Sea.

The Caspian and Aral Seas are related by territorial proximity and isolation from the world ocean. Climatic variations are the main, if not sole, factor governing the surface levels of the seas. During long-term periods irregular fluctuations in levels of the seas were due to significant differences in the natural conditions of watersheds, varying regimes of streamflow, and to size of the actual seas and their basins. During short-term periods variable changes in periods of increased and reduced moisture in the sea basins are also a factor. (Josefson-USGS)
W74-10229

SYSTEMS OF A WIND-WAVE FIELD (SISTEMY POLYA VETROVYKH VOLN),
Gosudarstvennyi Proektno-Izyskatelskii i Nauchno-Issledovatelskii Institut Morskogo Transporta 'Soyuzmorniiproekt', Moscow (USSR).
For primary bibliographic entry see Field 2E.
W74-10258

POSSIBILITY OF MAPPING ICE CONDITIONS ON LARGE LAKES FROM SATELLITE IMAGERY (VOZMOZHNOST' KARTIROVANIYA LEDOVOY OBSTANOVKI NA KRUPNYKH OZERAKH PO SNIMKAM S ISKUSSTVENNYKH SPUTNIKOV ZEMLI),
Gosudarstvennyi Gidrologicheski Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2C.
W74-10266

EUTROPHICATION AND RECOVERY IN EXPERIMENTAL LAKES: IMPLICATIONS FOR LAKE MANAGEMENT,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5C.
W74-10294

2I. Water In Plants

LITTER AND SOIL MICROBIAL DYNAMICS IN A DECIDUOUS FOREST STAND,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-09823

A BIBLIOGRAPHY OF THE ZOOLOGY OF TENNESSEE AND THE TENNESSEE VALLEY REGION,
Office of Information Services (AEC), Oak Ridge, Tenn.
C. S. Shoup.
Avail: NTIS, Springfield, Va., as Rept. No. NP-19905; $7.60/copy, $1.45/microfiche. Report No. NP-19905, 1974. 255 p, 3352 ref, 2 append.

Descriptors: *Bibliographies, Tennessee, River basins, Rivers, *Tennessee River, Documentation, Publications, Wildlife, Systematics, Ecology, Ecosystems, Animal groupings, *Wildlife.
Identifiers: *Zoology, *Tennessee Valley Region, *Clinch River(Tenn).

This bibliography is a listing of published papers from the periodical literature, with some reports and dissertations that have been found, all dealing with the fauna of the State of Tennessee and nearby areas in the valleys of the Tennessee and Cumberland rivers. The main body of the list comprises taxonomic and ecological publications that contain species lists or notices of collections in these areas, including, in some instances, publications that concern other terrestrial or aquatic forms found in nearby regions of North Carolina, Georgia, Alabama, Kentucky, or Virginia. These species must certainly overlap into Tennessee. (Houser-ORNL)
W74-09826

ON A NEW TREMATODE (EUCREADIUM GANGI H. SP.) FROM A FRESH-WATER FISH TRICHOGASTER FASCIATUS BLOCH AND SCHNEIDER,
Lucknow Univ. (India). Dept. of Zoology.
K. C. Pandey.
Indian J Zootomy. Vol 11, No 3, p 149-150, 1970(1972). Illus.
Identifiers: *Eucreadium-Gangi, *Fish infections, *India(Lucknow), New species, *Trematodes, *Trichogaster-Fasciatus.

A large number of specimens of T. fasciatus a common fresh-water fish, were examined at Lucknow, India. Three specimens were found infected with a single fluke of the genus Eucreadium Dayal, 1942, described as a new species, E. gangi.--Copyright 1973, Biological Abstracts, Inc.
W74-10040

MEMBRANE FILTER TECHNIQUE FOR ENUMERATION OF PSEUDOMONAS AERUGINOSA,
Environmental Protection Agency, Narragansett, R. I. Northeastern Water Supply Lab.
For primary bibliographic entry see Field 7B.
W74-10042

TEXTBOOK OF FISH CULTURE. BREEDING AND CULTIVATION OF FISH,
M. Huet, and J. A. Timmermans.
Fishing News (Books) Ltd.: London, England. 1972. Revised Ed. 436 p, Illus. Pr. 12.50.
Identifiers: *Breeding, Catfish, *Cultivation, Cyprinid, *Fish culture, Perciformes, Ponds, Salmonid, Stocking, *Publications, *Fish productivity.

This book, translated from the 4th edition of the French 'Traite de Pisciculture,' was entirely revised and considerably enlarged. Instead of being devoted mainly to fish breeding in temperate climates, it also discusses the principal types of fish culture practiced in both fresh and brackish water all over the world. It includes the rearing of more than 100 spp. of fish. A section on ponds and fish suitable for cultivation, includes construction and layout of ponds, and natural food and growth of cultivated fish. Breeding and cultivation of salmonids, of cyprinids, of perciformes and of catfish, as well as special types of fish cultivation for restocking, special types of fish breeding and cultivation and regional fresh water fish culture are discussed. The section on control and increase of production in fish cultivation covers the following specific topics: natural productivity of ponds, biological means of increasing production, maintenance and improvement of ponds, artificial feeding of fish; total productivity and stocking of ponds and enemies and diseases of fish. The section on harvesting of fish discusses fishing out the pond, sorting and grading the fish, storing the fish, transport of fish and conservation of fish. A list of principal cultivated fish, include scientific and common names in French and English. A general bibliography and a special bibliography for each chapter are included.--Copyright 1973, Biological Abstracts, Inc.
W74-10045

FAUNISTIC ECOLOGICAL STUDIES ON AQUATIC INSECT LARVAE (TRICHOPTERA, PLECOTPERA AND EPHEMEROPTERA) IN THE WIEHL, A HIGHLAND MEADOW STREAM IN THE OBERBERGISCHES LAND,
D. Jaeger.
Decheniana, Vol 125 No 1/2, p 23-41, 1972. Illus. (English summary).
Identifiers: Aquatic insects, Ecological studies, Ephemeroptera, *Germany(Wiehl), Highland, Larvae, *Mayflies, *Caddinflies, *Stoneflies.

Faunistic and ecological studies of the middle of the Wiehl (West Germany) a stony running water in the area of the future Wiehl barrage in the 'Oberbergisches Land' were done from Jan. to Dec. 1970. Larvae of caddis flies (Trichoptera), stone flies (Plecoptera) and may flies (Ephemeroptera) were collected and determined. Hydrophysical and hydrochemical conditions were investigated. The numbers of species found are 18 caddis flies, 11 stone flies and 13 May flies. The comparable fauna of the Rhine river in the west is entirely different. There is a continuous transition to the Sauerland in the east of the Wiehl area.--Copyright 1973, Biological Astracts, Inc.
W74-10047

REFLECTANCE OF VEGETATION, SOIL, AND WATER,
Agricultural Research Service, Weslaco, Tex.
For primary bibliographic entry see Field 7B.
W74-10252

COOK INLET SOCKEYE SALMON INVESTIGATIONS,
Alaska Dept. of Fish and Game, Juneau.
For primary bibliographic entry see Field 8I.
W74-10267

PARASITES OF YOUNG GRASS CARP CTENOPHARYNGODON IDELLA (VALENCIENNES) AT FISH FARMS OF THE VOLGA DELTA, (IN RUSSIAN),
G. A. Stepanova.
Tr Kasp Nauchno-Issled Inst Rybn Khoz. 26. p 250-254. 1971.
Identifiers: Apiosoma sp., *Carp, Cestodes, Colylurus-Pileatus, Crustaceans, Ctenopharyngodon-Idella, Deltas, Diplostomum sp., Diptozoon-Paradoxum, Epistylis-Sp, *Fish, Parasites, Gyrodactylus-Katheriner, Nematodes, Protozoa, Sphaerospora-Carassii, Trematodes, Trichodina sp., *USSR(Volga delta).

Complete parasitological autopsy was used to investigate 115 specimens of grass carp less than 1 yr old, 42 1 yr old, 48 2 yr old and 29 adult specimens from ponds of fish farms in the Astrakhan region, USSR. The study revealed 26 spp. of parasites: 12 protozoans, 4 manogenetic flukes, 2 cestodes, 6 trematodes, 1 nematode, and 1 parasitic crustacean. The species composition of parasites increases with age. The seasonal dynamics of infection of 1- and 2-yr-old grass carp by the parasites was traced. The parasitic fauna of the grass carp, which was introduced in the fishery of the Volga delta, is represented by local and imported species, of which the local species of parasites predominate. The following species of parasites were found for the first time in grass carp at fish farms of the Volga delta: Sphaerospora carassii, Trichodina nigra, Apiosoma piscicola, A. magna, A. minimicro nucleata, Epistylis sp., Gyrodactylus kathariner, Diptozoon paradoxum, Colylurus pileatus, Diplostomum macroctomum, Diplostomum mergi, Trichodina reticulata, and Trichodina pediculus.--Copyright1973, Biological Abstracts, Inc.
W74-10313

THE EFFECT OF PARENT ROCK ON SOIL FORMATION IN THE TAIGA-FOREST ON THE RIGHT BANK OF THE OB RIVER, (IN RUSSIAN),
Moscow State Univ. (USSR).
E. D. Nikitin.
Biol Nauki. Vol 14, No 12, p 100-104. 1971.
Identifiers: Cold climates, Forests, *Parent rock, Rivers, *Soil formation, Taiga, *USSR(Ket-Tymsk interfluve area), Waterlogging.

The soil cover of the Ket-Tymsk interfluve area was studied. Cold climate and waterlogging weakens the soil buildup process. Under such conditions the intensity of podzolic soil formation depends on the composition of the cover and its filtering properties. The soil composition of the various layers is presented.--Copyright 1973, Biological Abstracts, Inc.
W74-10324

RECORDING WATER USE BY MEANS OF DIGITAL EQUIPMENT,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
For primary bibliographic entry see Field 7B.
W74-10332

2J. Erosion and Sedimentation

WATER MOTION AND WATER-SEDIMENT INTERACTION,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5B.
W74-09863

LONGSHORE SAND TRANSPORT INTTHE SURF ZONE ALONG THE MEDITERRANEAN EGYPTIAN COAST,
Alexandria Univ., (Egypt). Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W74-09891

EFFECTS OF HIGH-MAGNITUDE FLOODS ON CHANNEL FORM: A CASE STUDY IN MARYLAND PIEDMONT,
Southern Illinois Univ., Carbondale. Dept. of Geography.
A. Gupta, and H. Fox.
Water Resources Research, Vol 10, No 3, p 499-509, June 1974. 9 fig, 3 tab, 6 ref.

Descriptors: *Floods, *Channel erosion, *Channel morphology, Sediment transport, Scour, Erosion, Stream erosion, *Maryland, Historic floods, Flood plains, Alluvial channels, Sedimentary structures, Geomorphology.
Identifiers: *Patuxent River(Md).

Major changes in channel morphology were caused by four major floods in the Patuxent River basin in the Maryland piedmont during the summers of 1971-1972. High flows of August 3-4 and September 11-12, 1971, caused by thunderstorms were of 50-year and over 100-year recurrence intervals, respectively. On August 27, 1971, a nearby storm brought bank-full flooding and tropical storm Agnes again produced floods well over the 100-year level on June 21-22, 1972. Record discharges on the Patuxent and its tributary, the Little Patuxent, were recorded on September 11, 1971, and June 22, 1972, respectively. Among the more striking effects were destruction of floodplain vegetation, widening of stream channels, and clearing of the channels of all but very coarse materials. Low and medium flows succeeding each flood reduced enlarge channel widths by building up bar remnants with fines and forming new bars along channel margins, tending to destroy the evidence of such floods. Channels preserve flood-originated forms when high-magnitude floods occur with sufficient regularity. (Knapp-USGS)
W74-09904

CONCEPTS OF MATHEMATICAL MODELING OF SEDIMENT YIELD,
Geological Survey, Bay Saint Louis, Miss.
J. P. Bennett.
Water Resources Research, Vol 10, No 3, p 485-492, June 1974. 1 fig, 34 ref.

Descriptors: *Sediment yield, *Mathematical models, Reviews, Equations, *Erosion, Soil erosion, Sediment transport, Slopes.

A deterministic structure imitating a sediment yield model should mathematically approximate the behavior of two distinct phases of the phenomenon, the upland phase and the lowland channel phase. For upland erosion, research is most needed in quantifying gully erosion, whereas for lowland streams it is most needed to explain the influence of meanders on bed material transport and to develop a floodplain accounting component. In both phases, research is needed to explain the effects of unsteadiness and flow nonuniformities on transport. Sensitivity analysis studies of sediment yield models are needed to illustrate how well the models can be calibrated and what output precision can be expected from input data with known statistical characteristics. Present estimates indicate that although a regression of annual sediment discharge on annual water discharge might be expected to give a prediction within 20% of the observed value, even a well-calibrated digital model might give an error greater than 40% for a single storm on a small watershed. (Knapp-USGS)
W74-09905

STATISTICAL TESTS OF LEOPOLD'S SYSTEM FOR QUANTIFYING AESTHETIC FACTORS AMONG RIVERS,
Calgary Univ. (Alberta). Dept. of Geography.
For primary bibliographic entry see Field 6G.
W74-09913

THE SOIL CREEP--CURVED TREE FALLACY,
Geological Survey, Reston, Va.
R. L. Phipps.
Journal of Research of the U S Geological Survey, Vol 2, No 3, p 371-377, May-June 1974. 11 fig, 13 ref.

Descriptors: *Creep, *Dendrochronology, *Trees, Mass wasting, Degradation(Slope), Growth rates, Forests, Plant growth.

No evidence was found in eastern deciduous forests to substantiate statements that curved tree trunks, downslope tilted tree trunks, and upslope trailing tree root systems are the result of soil creep. Curvature and tilting of trunks are geotropic and phototropic responses to physical and physiological conditions unrelated to soil creep. The occurrence of upslope trailing of roots has not been demonstrated. The classical trunk shape, oblique at the base above which the trunk is straight, cannot result from soil creep which continuously tips the trunk downslope. Such a shape can result from any mechanical force or phototropism which exerts a much greater force when the tree is small than when it grows larger. Trees on slopes have a tendency to lean downslope as a phototropic response, which is a function of slope steepness and degree of shade tolerance of the individual tree species. (Knapp-USGS)
W74-09918

AVERAGE RATIOS OF URANIUM AND ORGANIC MATTER IN RECENT MARINE AND OCEAN SEDIMENTS (O SOOTNOSHENII SREDNIKH KONTSENTRATSIY URANA I ORGANICHESKOGO VESHCHESTVA V SOVREMENNYKH MORSKIKH I OKEANSKIKH OSADKAKH),
G. N. Baturin.
Akademiya Nauk SSSR Doklady, Vol 207, No 1, p 186-189, 1972. 1 tab, 21 ref.

Descriptors: *Geochemistry, *Organic matter, *Deposition(Sediments), Recent epoch, *Oceans, Sediments, Sands, Silts, Sedimentary basins(Geologic).
Identifiers: *USSR, *Uranium, *Organic carbon.

Uranium/organic carbon ratios were compared in different types of sediments containing varying amounts of uranium. Calculations of uranium/organic carbon ratios were made for sediments in the Aral, Caspian, Black, Azov, Baltic, and Kara Seas and in the Pacific, Indian, and Atlantic Oceans. In individual samples of marine and ocean sediments the uranium content varies between 0.00001 and 0.006, the organic carbon content between 0.1 and 15%, and the uranium/organic carbon ratio between 0.00003 and 0.003. Average values in each of the basins studied are more uniform and uranium/organic carbon ratios vary between 0.0001 and 0.0007. In most seas, smallest uranium/organic carbon ratios are found in sandy-silty sediments deposited at a relatively high rate. Largest uranium/organic carbon ratios are characteristic of slowly deposited sediments of halistatic zones, enriched in both organic matter and uranium. Average uranium/organic carbon ratios are largest in the Aral and Caspian Seas (0.0008 and 0.00045, respectively) and smallest in the Baltic (0.0003). In oceans where water contains 0.000003 g of uranium per liter, average uranium/organic carbon ratios in sediments vary between 0.0002 and 0.0007. Largest average ratios (0.0007) are characteristic of red clay in the Pacific. In most main types of marine and ocean sediments, average uranium/organic carbon ratios vary between 0.0002 and 0.0004. Major deviations from this ratio are due either to predominance of terrigenous uranium in sediments or to presence of phosphates. (Josefson-USGS)
W74-09935

THREE-DIMENSIONAL FLOW AND SEDIMENT TRANSPORT AT RIVER MOUTHS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 2L.
W74-09946

A PROPOSED OPEN BEACHES STATUTE FOR FLORIDA,
Miami Univ., Fla. Ocean Law Program.
P. A. Dales, III.
Report No 5, October 1973. 17 p.

Descriptors: *Florida, *State legislation, *Beaches, *Shore protection, *Coasts, Beach erosion, Berms, Dunes, Littoral drifts, Recreation, Recreation facilities, Shores, Sands, Tidal effects, Waves, Water law, Enforcement, Public rights, Easements, Access routes, Land use, Low water mark, Ownership of beds.

The proposal for a Florida Open Beaches statute is a result of the increasing belief that active beaches are subject to a public easement which has been used and should continue to be used by the public as a common. The proposal contemplates regulation through the police power of what use a private littoral landowner can make of his land. The proposed act includes a declaration of public rights and easements in the land between the extreme low tide and the line of vegetation. The Division of Recreation and Parks of the Department of Natural Resources is responsible for the regulation of recreational activities on beaches, and the Marine Resources Division of that department is charged with the protection of vital sand dunes. Permits for physical activity will issue after due regard is given for protection of public accesses to the beaches. Surveys of the coastal shores to establish beach limits, dune lines, and vegetation lines are provided. Penalties for violation of the statute are also included. (Proctor-Florida)
W74-09977

CONCENTRATION AND DISTRIBUTION OF TRACE ELEMENTS IN THE MAUMEE RIVER BASIN, OHIO, INDIANA AND MICHIGAN,
Ohio State Univ., Columbus. Dept. of Geology and Mineralogy.
For primary bibliographic entry see Field 5B.
W74-10084

SEPARATION OF CLAY MINERALS AND SOIL CLAYS USING ISOPYCNIC ZONAL CENTRIFUGATION,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-10125

SPLASH CORRECTION FACTORS FOR SOIL EROSION STUDIES,
Agricultural Research Service, Saint Paul, Minn.
D. A. Farrell, W. C. Moldenhauer, and W. E. Larson.
Soil Science Society of America Proceedings, Vol 38, No 3, p 510-514, May-June 1974. 4 fig, 10 ref, append.

Descriptors: *Impact(Rainfall), *Laboratory tests, *Soil erosion, Model studies, Soil surfaces, Erosion.
Identifiers: *Splash erosion.

Tests of soil detachment by raindrop impact are substantially affected by the size and shape of the container. The area factor for splash pans of circular or rectangular geometry can be readily found. (Knapp-USGS)
W74-10210

FISSION PARTICLE TRACKS IN MICAS AND MICACEOUS VERMICULITES AS RELATED TO CHEMICAL WEATHERING AND CATION EXCHANGE PROPERTIES,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5A.
W74-10214

VARIATION OF REGIME COEFFICIENTS IN PAKISTAN CANALS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-10219

THE EFFECT OF TOPOGRAPHY AND WATER EROSION ON RUNOFF (VLIYANIYE REL'YEFA I VODNOY EROZII NA STOK),
Odessa State Univ. (USSR).
G. I. Shvebs.
Vodnyye Resursy, No 2, p 62-77, 1974. 3 fig, 4 tab, 23 ref.

Descriptors: *Runoff, *Topography, *Erosion, Slopes, Overland flow, Precipitation(Atmospheric), Precipitation intensity, Runoff coefficient, Snow cover, Infiltration, Soil moisture, Soil properties, Sprinkling, Flumes, Equations.
Identifiers: USSR.

The qualitative effect of topography and erosion processes on runoff through redistribution of precipitation and changes in soil moisture infiltration and expenditure conditions is demonstrated. Relations which consider this phenomenon are presented, and conditions under which variability of runoff under the effect of topography most likely occurs are noted. (Josefson-USGS)
W74-10228

EVALUATION OF TEXTURAL PARAMETERS AS BEACH-DUNE ENVIRONMENTAL DISCRIMINATORS ALONG THE OUTER BANKS BARRIER, NORTH CAROLINA,
Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
For primary bibliographic entry see Field 2L.
W74-10247

IRON IN ATLANTIC SEDIMENTS (ZHELEZO V OSADKAKH ATLANTICHESKOGO OKEANA),
Akusticheskii Institut, Moscow (USSR).
Ye. M. Yemel'yanov, and I. I. Shurko.
Akademiya Nauk SSSR Doklady, Vol 209, No 3, p 699-702, 1973. 1 fig, 1 tab, 12 ref.

Descriptors: *Oceanography, *Atlantic Ocean, *Iron, *Sediments, Bottom sediments, Sediment distribution, Particle size, Pacific Ocean, Mapping.
Identifiers: *USSR, Ooze.

A total of 593 iron samples were collected and studied in the upper layer of bottom sediments in the Atlantic Ocean. Distribution of iron is fairly nonuniform across the ocean floor. This nonuniformity is due to irregular concentration of iron in different compositional-genetic types and particle-size fractions of sediments and to their spatial distribution characteristics. Highest iron concentrations were established in hydrogoethite-chamosite-glauconite sediments and the lowest in highly calcareous diatomaceous and biogenic deposits. Relatively high iron concentrations were also observed in glauconitic and volcanoclastic sediments and in pelagic ooze (red clay). The iron content in terrigenous and biogenic carbonate sediments increases in almost all cases from sand to pelitic ooze. In fine silty, silty-pelitic and pelitic ooze of the shelf zone, iron concentrations range from 1.93% to 6.50%, averaging 4.74% (32 samples). In ooze of the continental slope zone (depth of 200 to 4,500 m) iron concentrations range from 1.10% to 11.99%, averaging 5.14% (111 samples). In ooze of the basin zone (below 4,500 m) they range from 1.32% to 13.07%, averaging 5.61% (84 samples). Average concentrations of iron are much higher in sediments of the Atlantic than in those of the Black and Mediterranean Seas or in sedimentary rocks on land. Average iron content of Atlantic sediments is lower than that of Pacific sediments. In Pacific sediments particle-size distribution of iron is more uniform. Both differences are due to higher concentrations of volcanic material and decomposition products of igneous rocks in sediments of the Pacific. (Josefson-USGS)
W74-10257

ORIGIN OF CLAY MINERALS IN HOLOCENE BOTTOM SEDIMENTS OF THE SEA OF AZOV (O PROISKHOZHDENII GLINISTYKH MINERALOV SOVREMENNYKH DONNYKH OSADKOV AZOVSKOGO MORYA),
Ye. F. Shnyukov, and F. I. Kotlovskaya.
Akademiya Nauk SSSR Doklady, Vol 208, No 2, p 430-431, 1973. 1 fig, 1 tab, 4 ref.

Descriptors: *Petrology, *Sediments, *Bottom sediments, *Clay minerals, *Recent epoch, Dating, Age, Sedimentation rates, Mineralogy, Mapping.
Identifiers: *USSR(Sea of Azov), Ooze, Potassium-argon age method.

The rate of sedimentation in the Sea of Azov is relatively high. Sediment thickness ranges from 1.3 mm to 4 mm annually. The layer of semiliquid ooze is 5-10 m thick and in some places, for example, north of the Kerch' Strait, it is 35 m thick. Ooze covers most of the sea floor and is composed almost entirely (99%) of clay minerals, mainly hydromica and montmorillonite. Other minerals generally occur in very small concentrations. The age of clay minerals comprising bottom sediments of the sea is considerable and ranges from 233 to 360 million years. Clay minerals of bottom sediments are clastic forms derived from surrounding land and may have been redeposited several times before accumulating in the present area of the sea. (Josefson-USGS)
W74-10262

EVOLUTION OF THE SON DRAINAGE,
Saugar Univ. (India). Centre of Advanced Study in Geology.
S. Lakshmanan.
Proceedings of the Indian National Science Academy, Vol 38A, No 1, 2, p 21-31, January, 1972. 4 fig, 19 ref.

Descriptors: *Drainage, *Rivers, *Faulting, *Drainage systems, Geology, *Erosion, Flow, Tributaries, Hydrology, Petrology.
Identifiers: *India(Son Valley).

The present drainage of the Son valley area was superposed from a Deccan Trap cover, and the course of the Son river has been controlled by lithology and not by any major faulting. This was determined from a geological study of the western portion of the Son valley where the Son river takes an abrupt east northeast bend from its northerly course. Apparently there is a Pre-Trappean erosion surface at about 1600 ft above sea level, and the drainage appears to have originated on the Deccan Traps which were later denuded away to expose the underlying older formations. By a process of differential and headward erosion, all the northward flowing tributaries were finally captured to form the Son river. (Prague-FIRL)
W74-10285

2K. Chemical Processes

INTERFACIAL INTERACTION OF WATER AND SILICATE MINERALS,
Missouri Univ., Kansas City. Dept. of Physics.
J. M. Phillips, P. L. Gutshall, and M. Oglesby.
Available from the National Technical Information Service as PB-233 791 $3.75 in paper copy, $1.45 in microfiche. Completion Report, Missouri Water Resources Research Center, Columbia, July 1, 1974. 51 p, 7 fig, 2 tab, 10 ref, 3 append. OWRR A-057-MO(1), 14-31-0001-3825.

Descriptors: *Groundwater, Hydrologic cycle, *Silicates, Bonding, Minerology, Clays, Ions, Earth-water interfaces, Soil chemical properties, Soil physical properties.
Identifiers: *Selenite, *Interlay binding energy, Muscovite.

The study deals with the basic interactions of water with the surface of minerals. The problems of bonding and migration of water molecules upon sheet structures of mineral samples were investigated. The minerals used in the program have surface structures that are similar and in some cases identical to those found in clays. This study focused upon the molecular level rather than on the bulk property level of capillarity and hydraulics. The interlayer binding energy (IBE) of selenite was measured. The measurements were made within a test chamber in which the temperature and atmospheric pressure of the sample could be controlled and monitored. There was no significant difference in the IBE of selenite in air (716 ergs/cm2) and in vacuum (704 ergs/cm2). There was a slight difference in the low temperature IBE (720 ergs/cm2); however, this was attributable to effects of cold on the mechanism. It was concluded that the IBE is independent of atmospheric and temperature effects within the range of temperature and pressure studied. The IBE of ionic bound lamella of Muscovite Phlogopite, Margarite, and Xanthophyllite has been calculated. Temperature dependence of water mobilities has been studies in the cleavage chamber and in the Varian-MAT SM1-B high resolution, double focus mass spectrometer.
W74-09805

ASSOCIATION CONSTANTS OF ION PAIRS IN NATURAL WATERS,
Missouri Univ., Columbia. Dept. of Geology.
P. B. Hostetler, and W. R. Almon.
Available from the National Technical Information Service as PB-233 789 $4.00 in paper copy, $1.45 in microfiche. Completion Report, Missouri Water Resources Research Center, Columbia, Jun 5, 1974. 72 p, 7 fig, 4 tab, 15 ref, 2 append. OWRR A-043-MO(1), OWRR-14-31-0001-3225.

Descriptors: *Aqueous solutions, *Water chemistry, *Chemical properties, Equilibrium, Thermodynamic behavior, Ions, *Volumetric analysis, Hydrogen ion concentration, Enthalpy, Carbonates, Chemical analysis, Calcium.
Identifiers: *Association constants, *Ion pairs.

An experimental approach which is directly applicable to almost any system of the nature M+m.H2O.CO2 for the investigation of MHCO3 (m-1)+ and MCO3 (M-2)+ ion pairs in their appropriate pH ranges. The only limit is that significant imparing occurs before precipitation. The principal advantages of this system and (1) the experiments are arranged as pH titrations and (2) the ability to 'float' a 1HCO-3 to achieve convergence of the titration plots does away with the necessity for absolute values of the dissociation constants of carbonic acid. The technique allows ion pair formation constants to be calculated from the known mass balance equation of the titrant solutions and from the change in pH between consecutive steps in the titration. The use of delta pH between steps is a better measurement than the absolute pH as random errors tend to cancel out over the run. Thus the average log kp calculated from each run is a more reliable measurement than log kf values calculated from absolute pH. The experimental system can be expanded to almost any system of ion pairing or complexation in which there is a pH change during the reaction. The experimental system was applied to the CaCl2, CO2, H2O system and the formation constants of CaHCO+3 were determined from 10 degree to 90 degree C. The value obtained at 25 degree C agrees well with literature values and the enthalpies derived from the partial of log K with respect to T agree to a reasonable extent to enthalpies measured by solution calorimetry.
W74-09806

DETERMINATION OF NITRITE AND NITRATE IONS IN NATURAL WATERS USING AROMATIC ORTHO DIAMINES AS REAGENTS,
Wisconsin Univ., Green Bay. Ecosystems Analysis.
For primary bibliographic entry see Field 5A.
W74-09809

ANNUAL PROGRESS REPORT FOR THE PERIOD JULY 1971-JUNE 1972-NEW BRUNSWICK LABORATORY.
New Brunswick Lab. (AEC), N.J.
For primary bibliographic entry see Field 5A.
W74-09830

MOUND LABORATORY CHEMISTRY AND PHYSICS PROGRESS REPORT: JANUARY-MARCH 1972.
Mound Lab., Miamisburg, Ohio.
Available from NTIS, Springfield, Va., as Rept. No. MLM-1903. $4.00/copy, $1.45/microfiche. Report No. MLM-1903, October 1972. 25 p, 1 fig, 5 tab, 12 ref.

Descriptors: Research and development, *Chemical reactions, *Analytical techniques, Chemistry, Inorganic compounds, Tritium, Gases.
Identifiers: *Plutonium protactiniam, *Thorium, *Chemical recovery.

Progress is reported in separations chemistry, inorganic chemistry, and analytical chemistry. The recovery of protactinium-231 and thorium-230 is discussed. The problem of specifying solution conditions suitable for the formation of trivalent, tetravalent, pentavalent and hexavalent plutonium in identical concentrations is discussed, and a method of solving this multiple point problem is proposed. The suggestion is made that plutonium may exist in environmental waters in forms other than hydrated tetravalent plutonium hydroxide. Development of a method for the simultaneous determination of tritium gas and tritiated water vapor in air samples is continuing. A spectrographic procedure for the analysis of impurities in solution samples was developed. (Houser-ORNL)
W74-09860

MODELING FLOW AND CHEMICAL QUALITY CHANGES IN AN IRRIGATED STREAM-AQUIFER SYSTEM,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 5B.
W74-09883

THE MIXING PATTERNS OF THE JORDAN RIVER IN LAKE KINNERET,
Kinneret Limnology Lab., Tiberias (Israel).
For primary bibliographic entry see Field 2H.
W74-09890

SEASONAL VARIATION OF THE WATER MASS ALONG THE OREGON-NORTHERN CALIFORNIA COAST,
Oregon State Univ., Corvallis. School of Oceanography.
R. H. Bourke, and J. G. Pattullo.
Limnology and Oceanography, Vol 19, No 2, p 190-198, March 1974. 3 fig, 4 tab, 10 ref.

Descriptors: *Oceanography, *Salinity, *Water temperature, *Oregon, *California, Sea water, Mixing, Continental shelf, Currents(Water), Rivers, *Columbia River.

Temperature and salinity data collected at five Oregon-northern California coastal stations from 1960 to 1971 were used to assess the influence of local processes in modifying the water mass along the coast. A bivariate model was constructed for the summer and winter seasons at each coastal station, permitting a quantitative measure of the degree of importance of each process. In summer the dominant modifying process is different at each shore station with local heating, upwelling, and mixing with shelf water, slope water and Columbia River water being the major factors. In winter rainfall and runoff is the dominant process along the coast except near the northern border where mixing occurs slightly more frequently. In winter offshore surface waters within 81 km of the coast have nearly the same temperature and salinity as the waters at the coast. In summer offshore surface waters become cooler and more saline in the shoreward direction with the coolest and saltiest water occurring at the coast. (Knapp-USGS)
W74-09892

BICARBONATE AND CARBONATE ION-PAIRS AND A MODEL OF SEAWATER AT 25 C,
Oregon State Univ., Corvallis. School of Oceanography.
R. M. Pytkowicz, and J. E. Hawley.
Limnology and Oceanography, Vol 19, No 2, p 223-234, March 1974. 3 fig, 7 tab, 41 ref. NSF GA-17011 and GA-36057X ONR N00014-67-A-0369-0007.

Descriptors: *Bicarbonates, *Carbonates, *Seawater, *Carbon dioxide, *Water chemistry, *Equilibrium, Saturation, Ions, Anions, Cations, Polyelectrolytes, Salinity, Hydrogen ion concentration.
Identifiers: Association constants.

The apparent (stoichiometric) association constants for the formation of ion-pairs between bicarbonate and carbonate and the major cations of seawater at 25 deg C were determined experimentally. The results were used, in conjunction with earlier data on sulfate ion-pairs, to calculate

the concentrations of the major species present in seawater. (KnappiUSGS)
W74-09894

THE ION-ASSOCIATION MODEL AND THE BUFFER CAPACITY OF THE CARBON DIOXIDE SYSTEM IN SEAWATER AT 25 C AND 1 ATMOSPHERE TOTAL PRESSURE,
Marine Biological Association of the United Kingdom Plymouth (England). Plymouth Lab.
M. Whitfield.
Limnology and Oceanography, Vol 19, No 2, p 235-248, March 1974. 11 fig, 5 tab, 27 ref.

Descriptors: *Bicarbonates, *Carbonates, *Sea water, *Carbon dioxide, *Water chemistry, *Equilibrium, Saturation, Ions, Anions, Cations, Polyelectrolytes, Salinity, Hydrogen ion concentration.
Identifiers: Association constants.

The ion-association model of carbonate chemistry in seawater was extended to calculate the contributions of the various ion-pair formation reactions to the buffer capacity of the carbon dioxide system. These reactions make the major contribution to the equilibrium buffer capacity at pH values greater than 8. The indifference of the pH to quite large changes in solution composition arises because the metal-carbonate ion-pairs form only a small proportion of the total cation concentration under normal conditions. (Knapp-USGS)
W74-09895

GEOCHEMICAL INDICATORS OF SUBSURFACE TEMPERATURE--PART 1, BASIC ASSUMPTIONS,
Geological Survey, Menlo Park, Calif.
R. O. Fournier, D. E. White, and A. H. Truesdell.
Journal of Research of the U S Geological Survey, Vol 2, No 3, p 259-262, May-June 1974. 1 fig, 16 ref.

Descriptors: *Geochemistry, *Water temperature, *Geothermal studies, *Hot springs, Thermal springs, Thermal water, Mineral water, Water chemistry, Equilibrium, Silica.

The chemical and isotopic compositions of hot-spring water and gas may be used to estimate subsurface temperatures. The basic assumptions inherent in the methods include (1) a temperature-dependent reaction at depth, (2) a supply of the solid phase involved in the reaction to permit saturation of the constituent used for geothermometry, (3) water-rock equilibrium at depth, (4) negligible re-equilibration as the water flows to the surface, and (5) no dilution or mixing of hot and cold water. The first three assumptions are probably good for a few reactions that occur in many places. The last two assumptions probably are not valid for many hot-spring systems; information obtained is therefore for the shallower parts of those systems, or a limiting temperature (generally a minimum) is indicated. (See also W74-09915) (Knapp-USGS)
W74-09914

GEOCHEMICAL INDICATORS OF SUBSURFACE TEMPERATURE--PART 2, ESTIMATION OF TEMPERATURE AND FRACTION OF HOT WATER MIXED WITH COLD WATER,
Geological Survey, Menlo Park, Calif.
R. O. Fournier, and A. H. Truesdell.
Journal of Research of the U S Geological Survey, Vol 2, No 3, p 263-270, May-June 1974. 5 fig, 2 tab, 20 ref.

Descriptors: *Geochemistry, *Water temperature, *Geothermal studies, *Hot springs, Thermal springs, Thermal water, Mineral water, Water chemistry, Equilibrium, Silica.

The water in many warm springs with large rates of flow consists of mixtures of hot water that has come from depth and of shallow cold water. Under favorable conditions the original temperature of the hot water and the fraction of the cold water in the mixture can be estimated by using the measured temperature and silica content of the warm spring water and the temperature and silica content of nonthermal water in the region. The method has been applied with apparent success at Yellowstone National Park. (See also W74-09914) (Knapp-USGS)
W74-09915

THE CALCULATION OF AQUIFER CHEMISTRY IN HOT-WATER GEOTHERMAL SYSTEMS,
Geological Survey, Menlo Park, Calif.
A. H. Truesdell, and W. Singers.
Journal of Research of the U S Geological Survey, Vol 2, No 3, p 271-278, May-June 1974. 5 tab, 41 ref.

Descriptors: *Geochemistry, *Water temperature, *Geothermal studies, *Hot springs, *Computer programs, Thermal springs, Thermal water, Mineral water, Water chemistry, Equilibrium, Silica.
Identifiers: *New Zealand.

The temperature and chemical conditions (pH, gas pressure, and ion activities) in a geothermal aquifer supplying a producing bore can be calculated from the enthalpy of the total fluid (liquid + vapor) produced and chemical analyses of water and steam separated and collected at known pressures. Alternatively, if a single water phase exists in the aquifer, the complete analysis (including gases) of a sample collected from the aquifer by a downhole sampler is sufficient to determine the aquifer chemistry without a measured values of the enthalpy. The assumptions made are that the fluid is produced from a single aquifer and is homogeneous in enthalpy and chemical composition. Calculations of aquifer chemistry involving large amounts of ancillary information and many interations require computer methods. A computer program in PL-1 to perform these calculations is available from the National Technical Information Service as document PB-219 376. (Knapp-USGS)
W74-09916

OCCURRENCE OF DISSOLVED ORGANIC CARBON IN SELECTED GROUND-WATER SAMPLES IN THE UNITED STATES,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5B.
W74-09917

AVERAGE RATIOS OF URANIUM AND ORGANIC MATTER IN RECENT MARINE AND OCEAN SEDIMENTS (O SOOTNOSHENII SREDNIKH KONTSENTRATSIY URANA I ORGANICHESKOGO VESHCHESTVA V SOVREMENNYKH MORSKIKH I OKEANSKIKH OSADKAKH),
For primary bibliographic entry see Field 2J.
W74-09935

SEPARATION OF CLAY MINERALS AND SOIL CLAYS USING ISOPYCNIC ZONAL CENTRIFUGATION,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-10125

A CAPILLARY TUBE DIFFUSION CELL FOR MEASURING ION DIFFUSION IN AQUEOUS SOLUTIONS,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
For primary bibliographic entry see Field 5A.
W74-10207

CALCITIZATION OF EDWARDS GROUP DOLOMITES IN THE BALCONES FAULT ZONE AQUIFER, SOUTH-CENTRAL TEXAS.
California State Univ., San Diego. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2F.
W74-10208

ARTIFICIAL WEATHERING OF OXIDIZED BIOTITE: IV. THE INHIBITORY EFFECT OF POTASSIUM ON DISSOLUTION RATE,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nturition.
For primary bibliographic entry see Field 2G.
W74-10209

THE EFFECT OF OVERBURDEN PRESSURE ON CHLORIDE AND WATER MOVEMENT IN SWELLING CLAY SOIL,
Texas Agricultural Experiment Station, College Station.
For primary bibliographic entry see Field 2G.
W74-10213

FORMATION OF CLAY-PROTEIN COMPLEXES,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 2G.
W74-10245

ADSORPTION OF LYSOZYME AND OVALBUMIN BY CLAY: EFFECT OF CLAY SUSPENSION PH AND CLAY MINERAL TYPE,
New Hampshire Univ., Durham. Inst. of Natural and Environmental Resources.
For primary bibliographic entry see Field 2G.
W74-10246

IRON IN ATLANTIC SEDIMENTS (ZHELEZO V OSADKAKH ATLANTICHESKOGO OKEANA),
Akusticheskii Institut, Moscow (USSR).
For primary bibliographic entry see Field 2J.
W74-10257

ORIGIN OF CLAY MINERALS IN HOLOCENE BOTTOM SEDIMENTS OF THE SEA OF AZOV (O PROISKHOZHDENII GLINISTYKH MINERALOV SOVREMENNYKH DONNYKH OSADKOV AZOVSKOGO MORYA),
For primary bibliographic entry see Field 2J.
W74-10262

ISOTOPIC AND CHEMICAL CHARACTERISTICS OF HIGH-LEVEL GROUNDWATER ON OAHU, HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 4B.
W74-10273

PRESERVATION OF SOIL SAMPLES FOR INORGANIC NITROGEN ANALYSES,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W74-10334

EFFECT OF ION-PAIR FORMATION ON THE SOLUBILITY PRODUCT,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
For primary bibliographic entry see Field 2G.
W74-10345

2L. Estuaries

RADIOACTIVITY IN SURFACE AND COASTAL WATERS OF THE BRITISH ISLES, 1971,
Ministry of Agriculture, Fisheries and Food, Lowestoft, (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 5D.
W74-09875

LONGSHORE SAND TRANSPORT INTTHE SURF ZONE ALONG THE MEDITERRANEAN EGYPTIAN COAST,
Alexandria Univ., (Egypt). Dept. of Oceanography.
S. H. Sharaf EL Din.
Limnology and Oceanography, Vol 19, No 2, p 182-189, March 1974. 5 fig, 17 ref.

Descriptors: *Sediment transport, *Deltas, *Sediment load, Sediment yield, Sedimentation, Littoral drift, Streamflow, Surf, Waves(Water), Sands, Tracers.
Identifiers: *Nile Delta(Egypt).

The Nile Delta coast has been altered considerably in its configuration during the last 100 years. The sediment load carried by the Nile during the flood season built up the two peninsulas of Damietta and Rosetta, but after 1900, the sediment load began to decrease and excessive erosion was noted. Tracer sand experiments were made along the coast in 1968 and 1971. There is some evidence that the movement of sand beyond the wave breaker zone is due only to currents generated by the wind, but inside the breaker zone it is due to longshore drift. The sediments, which generally vary from 0.25 to 0.15 mm in size, move mostly in suspension. Most of the eroded material finds its way into the Damietta inlet where it settles, forming a spit. (Knapp-USGS)
W74-09891

RESONANT AND NONRESONANT MOTION IN A SPINDLE-SHAPED BASIN WITH AN ENTRANCE,
Mitchell Coll. of Advanced Education, Bathurst (Australia).
For primary bibliographic entry see Field 2E.
W74-09893

HYDROGRAPHY OF THE CHESAPEAKE AND DELAWARE CANAL,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 4A.
W74-09944

THREE-DIMENSIONAL FLOW AND SEDIMENT TRANSPORT AT RIVER MOUTHS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
W. R. Waldrop, and R. C. Farmer.
Available from NTIS, Springfield, Va. 22151 AD-768 037 Price $4.50 printed copy; $1.45 microfiche. Lousiana State University Coastal Studies Institute Technical Report No 150, September 1973. 137 p, 11 fig, 8 tab, 60 ref, 4 append. ONR Contract N00014-69-A-0211-0003.

Descriptors: *Sediment transport, *Open channel flow, *Deltas, *Numerical analysis, Simulation analysis, Mathematical models, Turbulence, Convection, Suspended load, Sedimentation, Settling velocity, Finite element analysis, Computer programs.

Three-dimensional flow and sediment transport processes of a river emptying into the sea were analyzed. The basic equations derived to describe this flow include the effects of buoyancy caused by density differences between freshwater and saltwater, inertia of river and coastal currents, and differences in hydrostatic head throughout the mixing region. Turbulence effects were included through an appropriate eddy viscosity model. Combinations of river stages and tidal currents were represented as systems of steady-state flow fields. A numerical procedure was developed and implemented on a digital computer for the solution of the equations. This numerical procedure is an asymptotic time-dependent finite-difference technique but includes some features of a relaxation technique. Computed flow fields were used to track the suspended load of the river as determined from field data. Deposition of these particles was primarily governed by convective processes and particle settling velocities. Deposition rates were used to compute deltaic growth. (Knapp-USGS)
W74-09946

PUGET SOUND,
For primary bibliographic entry see Field 5C.
W74-09955

SAN FRANCISCO BAY,
For primary bibliographic entry see Field 5C.
W74-09956

BIG CYPRESS NATIONAL FRESH WATER RESERVE.
For primary bibliographic entry see Field 6E.
W74-10056

PROTECTION OF NATIONS WETLANDS--POLICY STATEMENT.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10062

SECTION 10 OF THE RIVERS AND HARBORS ACT: THE EMERGENCE OF A NEW PROTECTION FOR TIDAL MARSHES,
For primary bibliographic entry see Field 6E.
W74-10066

THE PATRIMONIAL SEA,
London School of Economics and Political Science (England).
For primary bibliographic entry see Field 6E.
W74-10067

HOW THE STUDY STANDS NOW: INVENTORY PHASE NEARLY COMPLETE; PLANNING PHASE BEGUN.
For primary bibliographic entry see Field 6B.
W74-10080

POSSIBLE EFFECT OF CHANGES IN HYDROGEOLOGIC CONDITIONS OF THE PITSUNDA PENINSULA ON PITSUNDA PINE TREES (O VOZMOZHNOSTI VLIYANIYA IZMENENIY GIDROGEOLOGICHESKIKH USLOVIY P-OVA PITSUNDA NA PITSUNDSKUYU SOSNOVUYU ROSHCHU),
For primary bibliographic entry see Field 3C.
W74-10224

EVALUATION OF TEXTURAL PARAMETERS AS BEACH-DUNE ENVIRONMENTAL DISCRIMINATORS ALONG THE OUTER BANKS BARRIER, NORTH CAROLINA,
Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
G. L. Schideler.
Southeastern Geology, Vol 15, No 4, p 201-222, April 1974. 11 fig, 1 tab, 29 ref.

Descriptors: *Beaches, *Dunes, *Dune sands, *Sedimentology, Provenance, Sediment sorting, Mineralogy, Aeolian soils, *Sediment transport, Sedimentation, *North Carolina.

The depositional environments of beach and dune sands were studied using textural parameter combinations in sediments of the Outer Bands barrier chain along the Middle Atlantic coast. Combinations of moment measures, maximum particle size, and total heavy mineral contents were evaluated in differentiating foreshore, berm, and dune populations. The more effective parameters in distinguishing beach and dune sands along the barrier are the less sensitive measures that reflect basic competence differentials between the aeolian and hydraulic regimes. The more sensitive parameters that reflect differences in component subpopulations are of more limited utility because of their greater susceptibility to bias induced by local physiography and source materials, sampling techniques, and analytical procedures. Comparisons of total heavy mineral contents are effective in differentiating adjacent foreshore-berm couplets and foreshore-dune couplets but ineffective in distinguishing berm-dune couplets. Relative differences in heavy mineral concentrations among the three populations reflect both the varying degrees of aeolian influence and the relative amounts of sediment interchange between populations. (Knapp-USGS)
W74-10247

COMPARATIVE ASPECTS OF COASTAL ZONE MANAGEMENT: BACKGROUND INFORMATION ON THE LAW OF TEXAS AND OTHER STATES IN VIEW OF THE COASTAL ZONE MANAGEMENT ACT OF 1972.
Texas Law Inst. of Coastal and Marine Resources, Houston.
For primary bibliographic entry see Field 6E.
W74-10272

GRAYS HARBOR ESTUARY, WASHINGTON; REPORT 1, VERIFICATION AND BASE TESTS. APPENDIX A: SUPPLEMENTARY BASE TEST DATA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-10317

DISINFECTION PRACTICES IN THE SAN FRANCISCO BAY AREA,
Wallace and Tiernan, Inc., San Francisco, Calif.
For primary bibliographic entry see Field 5D.
W74-10350

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

SOLUBILITIES OF CALCIUM SULFATE DIHYDRATE AT 25C IN BRACKISH WATERS AND THEIR CONCENTRATES: EFFECT OF CALGON ADDITIVE AND PREDICTIONS FOR REVERSE OSMOSIS PROCESSES,
Oak Ridge National Lab., Tenn.
L. B. Yeatts, P. M. Lantz, and W. L. Marshall.
Available from the National Technical Information Service, as ORNL-4914, $5.45 in paper copy, $1.45 in microfiche. Report ORNL-4914, September 1973. 64 p, 17 fig, 21 tab, 9 ref.

Descriptors: *Calcium sulfate, *Reverse osmosis, *Brackish water, Saturation, Precipitation, Solids, Solutions, Irrigation water, Saline waters, *Solubility, Wyoming, South Dakota, Arizona, *Desalination, Waste water treatment.
Identifiers: *Calgon, Commercial polyphosphate, Arizona(Wellton-Mohawk Canal), Gillette(Wyo.), Webster(So.Dak.).

The solubility of calcium sulfate dihydrate, a substance which can impede reverse osmosis (RO) processes by saturation precipitation in RO membrane pores, was determined at 25C in three typical brackish water compositions and their concentrates. These waters were synthetically prepared, and corresponded to compositions and concentrates of well waters used by the Office of Saline Water RO plants at Gillette, Wyoming, and Webster, South Dakota, and those of a post-irrigation water from the Wellton-Mohawk Canal in Arizona. A commercial solid polyphosphate preparation, Calgon, when added in small amounts (5-40 ppm in unconcentrated solutions) was shown to initially produce an apparent increase in the saturation concentration of hydrated CaSO4 (the solid phase). Latter (2-6 days), the solution concentration of CaSO4 decreased to near the expected solubilities in the in the absence of Calgon. The method of calculation of the solubility of CaSO4 and its hydrates in various saline waters, which has been used successfully for several years, is found to apply equally well to the calculation of saturation limits of hydrated CaSO4 in the present waters and concentrates. (Prague-FIRL)
W74-10036

3B. Water Yield Improvement

THE RIGHT CHEMICALS ARE ABLE TO RESTORE OR INCREASE WELL YIELD, PART II,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 8G.
W74-10085

RESISTIVITY METHODS IN PROSPECTING FOR GROUND WATER,
Kansas State Univ., Manhattan. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-10100

PROTECTION AGAINST HAILSTORMS IN MOLDAVIA,
L. A. Dinevich.
Available from NTIS, Springfield, Va 22151 as AD-773 523 Price $4.00 printed copy; $1.45 microfiche. Air Force Foreign Technology Division Translation Report FTD-HT-23-720-74, January 1974. 1 fig. (Translated from Nauchno-Populyarnyy Gidrometeorologicheskiy, Sbornik, Chelovek i Stikhiyo, p 174-175, 1972.)

Descriptors: *Hail, *Weather modification, *Cloud seeding, Precipitation(Atmospheric), Silver iodid, Lead, Weather, Cloud physics, Radar.
Identifiers: Rockets, *USSR(Moldavia).

The geographical location and relief of Moldavia, USSR, favors the development of massive cumulus-nimbus clouds and the formation of hail. In Moldavia antihail research was initiated in 1964. First, the hail-menacing clouds were detected by radar. Their coordinates and parameters were transmitted to the command post of the branch where the degree of potential hail hazard of the clouds was determined, and a solution was made for the necessary action to be taken. Orders were given to the appropriate rocket launch points by radio. The 'Oblako' rocket is a flying generator which atomizes additional artificial sublimation nuclei in the cloud. (Knapp-USGS)
W74-10232

SUMMARY REPORT--WEATHER MODIFICATION, FISCAL YEARS 1969, 1970, 1971,
GEOMET, Inc., Rockville, Md.
R. C. Koch, P. A. McGrath, M. W. Chandler, and D. J. Pelton.
Available from Sup Dok, GPO, Washington, D.C. 20402-Price $1.25. National Oceanic and Atmospheric Administration Publication, May 1973. 163 p, 29 fig, 182 ref.

Descriptors: *Weather modification, *Artificial precipitation, *Reviews, *Research and development, Cloud seeding, Cloud physics, Meteorology, Climatology, Precipitation(Atmospheric).

A summary report of domestic and foreign weather modification activities is presented for the fiscal years 1969, 1970, and 1971. The activities covered include observational and experimental studies in the field and in the laboratory. The weather phenomena include rainfall, snowfall, hurricanes, tornadoes, hailstorms, and fog. Progress in evaluating social, economic, legal, and ecological aspects is considered in addition to the technical aspects. The promising weather modification technology of the preceding decade failed to produce the expected benefits. As a result of investigations and needs for more detailed measurements of clouds and storms, much more detailed field investigations were carried out, and a greater understanding of the cloud and precipitation physics that control weather began to evolve. Refinements were also introduced to the technology of weather modification in this period. By the end of the decade, scientists had learned a great deal about how to apply available technology to modify the weather. Detailed field investigations are now being made, both to evaluate the available modification techniques and to provide more information about cloud physics and about how to improve the modification techniques. (Knapp-USGS)
W74-10233

EXPERIMENTAL AND THEORETICAL INVESTIGATIONS OF ARTIFICIAL CRYSTALLIZATION AND DISPERSAL OF SUPERCOOLED CLOUDS,
I. I. Gayvoronskiy, S. N. Dubinchuk, L. I. Krasnovskaya, A. V. Levin, and V. N. Podgurskaya.
Available from NTIS, Springfield, Va. 22151 as AD-773 294 Price $4.00 printed copy; $1.45 microfiche. Air Force Foreign Technology Division Translation Report FTD-MT-24-225-74, 1974. 13 p, 4 tab, 20 ref. (Translated from Trudy v Vsesoyuznogo Meteorologicheskogo S'yezda, Sektsiya Aktivnykh Vozdeystviy na Atmosfernyye Protsessy, Gidrometeoizdat, Leningrad, Vol 4, p 164-172, 1972),

Descriptors: *Cloud seeding, *Weather modification, *Cloud physics, Fog, Meteorology, *Crystallization.
Identifiers: *USSR.

Systematic experiments on the artificial crystallization of supercooled stratified clouds were initiated in the USSR in 1954 at the Central Aerological Observatory and in 1959 at the Ukrainian Scientific Hydrometeorological Institute. Propagation of artificial crystallization in supercooled stratified clouds, conditions of cloud formation, the procedure for introduction of the reagent, and the norm of seeding were studied. The expansion time of the zone of crystallization in the predominant majority of the cases is 30-40 minutes, and the maximum width of the zone varies within limits of 1400-4300 m. In clouds of small thickness (up to 300 m) the best visibility is observed at the edges of the zone, and retained in the center is a dense crystal mist, which makes visibility worse through the zone. (Knapp-USGS)
W74-10234

AIRBORNE MEASUREMENTS OF THE SIZE DISTRIBUTION AND THE CONDENSATION AND ICE NUCLEATING ABILITY OF PARTICLES PRODUCED BY AGI CONTAINING PYROTECHNICS AND ACETONE SOLUTION BURNERS,
Pacific-Northwest Lab., Richland, Wash.
A. J. Alkezweeny, and L. F. Radke.
Available from the National Technical Information Service as BNWL-SA-4716 $3.00 in paper copy, $1.45 in microfiche. Report No BNWL-SA-4716, August 1973. 13 p, 5 fig, 1 tab, 15 ref. Conf-730936--1. AEC Contract AT(45-1)1830.

Descriptors: *Cloud seeding, *Particle size, *Silver iodide, *Nucleation, *Weather modification, Aircraft, Measurement.

The size distribution and nucleating activity of particles generated by both AgI pyrotechnic flares and AgI-NH4I acetone solution burners were measured. The pyrotechnic flares produced particles generally larger than 0.1 micrometer in diameter which were good cloud condensation nuclei. Particles produced by the AgI-acetone burners were less than 0.1 micrometer in diameter and, by comparison with the pyrotechnic flares were relatively inefficient both as ice nuclei and cloud condensation nuclei. (Knapp-USGS)
W74-10239

REACTION OF HYGROSCOPIC PARTICLES TO A WARM FOG,
Navy Weather Research Facility, Norfolk, Va.
E. E. Hindman, II, and P. M. Tag.
Available from NTIS, Springfield, Va 22151 as AD-761 998. Price $3.00 printed copy; $1.45 microfiche. Technical Paper No 7-70, June 1970. 4 p, 2 fig, 1 ref.

Descriptors: Fog, *Weather modification, *Computer models, *Cloud seeding, Coalescence, Cloud physics, Particle size.
Identifiers: *Warm fog, *Fog dissipation.

A warm-fog computer model simulates the effect of introducing manmade hygroscopic particles into warm fog. Particle growth is by condensation and coalescence. The model is used to study warm-fog dissipation using salt particles and brine sprays, and comparisons between model results and field experiments indicate agreement. (Knapp-USGS)
W74-10253

CLOUD-PARTICLE SAMPLES AND WATER CONTENTS FROM A 1969 STORMFURY CLOUDLINE CUMULUS,
Navy Weather Research Facility, Norfolk, Va.
E. E. Hindman, II.
Available from NTIS, Springfield, Va 22151 as AD-761 997 Price $3.00 printed copy; $1.45 microfiche. Technical Paper No 5-70, May 1970. 9 p, 3 fig, 7 ref.

Descriptors: *Sampling, *Cloud seeding, *Weather modification, Particle size, Ice, Raindrops, Equipment, Instrumentation.

Liquid- and ice-water contents were measured in seeded portions of hurricanes and cloudline cumulus clouds. Aircraft are equipped with Formvar and foil-particle impactors. Cloud particles blast through a small slit and embed in liquid Formvar on rapidly moving 16-mm film. The Formvar hardens shortly after exposure and permanent fossils of the particles are produced. The smallest size particle which can be viewed is approximately 2 microns in diameter. In the foil sampler, a strip of aluminum foil moves slowly past a large sampling orifice equipped with a shutter. The shutter exposes the foil for only an instant, preventing particles from landing on one another. The particles leave distinct indentations in the foil. Particles larger than 200 microns in diameter can be viewed. Ice and water particles can be differentiated with some uncertainty. (Knapp-USGS)
W74-10254

ENGINEERING FOG-MODIFICATION EXPERIMENTS BY COMPUTER MODELLING,
Navy Weather Research Facility, Norfolk, Va.
P. M. Tag, D. B. Johnson, and E. E. Hindman, II.

Available from NTIS, Springfield, Va 22151 AD-760 675 Price $3.00 printed copy; $1.45 microfiche. Technical Paper No 1-70, January 1970. 29 p, 8 fig, 1 tab, 11 ref.

Descriptors: *Fog, *Weather modification, *Computer models, *Cloud seeding, Coalescence, Mathematical models, Cloud physics.
Identifiers: *Warm fog, *Fog dissipation.

A numerical model provides quantitative simulation of a wide range of warm-fog treatment materials and permits quantitative assessment of the results of such treatments. In addition, a variation of this model simulates the dissipation of cold fog using ice-phase treatments. (Knapp-USGS)
W74-10255

3C. Use Of Water Of Impaired Quality

PREDICTING OPTIMUM DEPTH OF PROFILE MODIFICATION BY DEEP PLOWING FOR IMPROVING SALINE-SODIC SOILS,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
For primary bibliographic entry see Field 2G.
W74-09812

ARID ZONE IRRIGATION,
For primary bibliographic entry see Field 3F.
W74-09815

IRRIGATION, DRAINAGE AND SALINITY.
Hutchinson and Co. Ltd. (Publishers), London, England. 1973. 510 p.

Descriptors: *Irrigation, Irrigaton effects, Irrigation water, *Drainage, Salt balance, *Saline soils, Saline water, *Salinity, Soil chemistry.

Irrigation in arid zones has often led to soil salinization. With the increase of the world's population and the rapid development of irrigated areas, this problem becomes more and more urgent. Not only must unproductive lands be placed under cultivation, but the productivity of irrigated areas must also be maintained. The experience gained in recent decades, along with a research which has been conducted regarding irrigation, drainage, and salinity, have produced a great variety of data. A compendium is presented of material prepared by numerous investigators throughout the world. The book not only covers the development of scientific knowledge, but also provides practical guidelines for field solutions. (Skogerboe-Colorado State)
W74-09821

RENOVATION OF SECONDARY EFFLUENT FOR REUSE AS A WATER RESOURCE,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-10197

A DEMONSTRATION OF THERMAL WATER UTILIZATION IN AGRICULTURE,
Eugene Water and Electric Board, Oreg.
For primary bibliographic entry see Field 5D.
W74-10199

POSSIBLE EFFECT OF CHANGES IN HYDROGEOLOGIC CONDITIONS OF THE PITSUNDA PENINSULA ON PITSUNDA PINE TREES (O VOZMOZHNOSTI VLIYANIYA IZMENENIY GIDROGEOLOGICHESKIKH USLOVIY P-OVA PITSUNDA NA PITSUNDSKUYU SOSNOVUYU ROSHCHU),
A. V. Zhuravlev.
Vodnyye Resursy, No 2, p 164-169, 1974. 1 fig, 1 ref.

Descriptors: *Hydrogeology, *Groundwater, *Saline water intrusion, *Saline water-freshwater interfaces, *Pine trees, Water types, Water chemistry, Hydrodynamics, Drainage effects, Salt tolerance.
Identifiers: *USSR(Abkhazia), *Pitsunda Peninsula(USSR), Water exchange, Mineralization.

Present-day hydrodynamic and hydrochemical conditions on the Pitsunda Peninsula (Abkhazia), formed after start of operation of the drainage system, are examined. Over most of the area of Pitsunda pine, which covers 350 ha, variable groundwater and salt regimes have no adverse effect on pine growth. On the basis of available data, the Pitsunda pine is assumed to have a relatively high salt tolerance. Basic directions of investigations on this problem are outlined. (Josefson-USGS)
W74-10224

TRICKLE IRRIGATION SOIL WATER POTENTIAL AS INFLUENCED BY MANAGEMENT OF HIGHLY SALINE WATER,
Utah State Univ., Logan.
P. Tscheschke, J. F. Alfaro, J. Keller, and R. J. Hanks.
Soil Science, Vol 117, No 4, p 226-231, 1974. 5 fig, 2 tab, 5 ref.

Descriptors: *Irrigation, *Investigation, *Soil water, Salts, Water quantity, Soil chemistry, Soil contamination, Root zone, Soil profile, *Saline water, Experimentation, Salt tolerance, *Tomatoes.
Identifiers: *Trickle irrigation, Salt accumulation.

The purpose was to determine the soil water potential and salt patterns in uniform soil profiles as a result of four different water management treatments. Cherry tomato plants were irrigated: daily with a volume of water equal to that used by the plant on the previous day; every other day with volumes of water being equal; below the water evapotranspired; and above the water evapotranspired. Although trickle irrigation offers the possibility of good yields when nontoxic highly saline water is used to irrigate, accumulated salts in the root zone may be a potential hazard. Soil water potential decreased in the soil profile as a result of salt accumulation with increased distance from the trickle source. The highest salt concentration occurred in the profiles irrigated with volumes of water below that evapotranspired by the tomato plants, indicating the importance of avoiding under irrigation when highly saline water is used with trickle irrigation. In addition, higher soil water potentials and higher yields resulted from irrigating with volumes above the evapotranspiration. (Prague-FIRL)
W74-10292

SALT TOLERANCE OF MEXICAN WHEAT: I. EFFECT OF NO3 AND NACL ON MINERAL NUTRITION, GROWTH, AND GRAIN PRODUCTION OF FOUR WHEATS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
B. C. Torres, and F. T. Bingham.
Soil Science Society of America Proceedings, Vol 37, No 5, p 711-715, September-October, 1973. 5 fig, 8 tab, 15 ref.

Descriptors: *Fertility, *Crop response, *Salinity, Nutrients, *Nitrogen, Crop production, Soil chemical properties, Crops, *Wheat, *Salt tolerance.
Identifiers: *Mexican wheat.

Wheat plants were grown to full maturity under sand culture conditions with variable levels of substrate NO3 and NaCl. Leaf samples were collected at early spike emergence for chemical analysis of Ca, Mg, Na, K, P, Cl, NO3, and total N. Growth measurements included those of flag leaf length, tiller and spike formation, and total straw and grain. The slower maturing variety, Cajeme 71, grew much more vigorously than the more rapidly maturing varieties Inia 66, Yecora, and Siete Cerros. The salt tolerance of Cajeme 71 was 2- to 4-fold greater than that of the other varieties tested. Leaf NO3 of samples collected at early spike emergence correlated with grain yields irrespective of substrate NaCl levels, suggesting that the growth retardation associated with excessive substrate NaCl was due in part to a Cl-induced NO3 deficiency. (Skogerboe-Colorado State)
W74-10328

INFLUENCE OF SALINITY ON FE, MN, AND ZN UPTAKE BY PLANTS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
E. V. Maas, G. Ogata, and M. J. Garber.
Agronomy Journal, Vol 64, No 6, p 793-795, November-December, 1972. 3 fig, 10 ref.

Descriptors: *Salinity, *Crop response, Crop production, Tomato, Soybean, Nutrients, Nutrient removal, Hydroponics, *Iron, *Zinc, *Manganese, Sodium chloride, Absorption.
Identifiers: Squash.

The influence of salinity was determined on the uptake of Fe, Mn, and Zn by plants during the period of rapid vegetative growth. Relatively few data are available on the micronutrient states of salt-stunted plants. Tomato, soybean, and squash were grown in the greenhouse in half-strength Hoagland's solution salinized with 0, 25, 50, 75, and 100 meq NaCl/liter. Concentrations of Fe and Zn increased in the roots and tops of each species with increasing ambient levels of NaCl. Manganese concentrations increased in tomato and soybean tops but decreased in squash tops. Concentrations of Mn in the roots of tomato and squash were reduced at all salt levels, but they increased in all but the 100 meq/liter treatment in soybean. The changes in contents as a function of salinity were in the order of twofold or less and all were significant at the 5% level or better. (Skogerboe-Colorado State)
W74-10336

NITROGEN, SALINITY, AND ACIDITY DISTRIBUTION IN AN IRRIGATED ORCHARD SOIL AS AFFECTED BY PLACEMENT OF NITROGEN FERTILIZERS,
Philippines Univ., Laguna. Coll. of Agriculture.
B. C. Felizardo, N. R. Benson, and H. H. Cheng.
Soil Science Society of America Proceedings, Vol 36, No 5, p 803-808, September-October, 1972. 6 fig, 2 tab, 13 ref.

Descriptors: *Nutrient removal, *Leaching, *Fertilizers, *Nitrogen, *Salinity, *Acidity, Fertilization, Application methods, Drainage effects, Environmental effects, *Orchards.

Vertical and lateral changes were determined in the distribution of nitrogen, salinity, and acidity occurring in an irrigated orchard soil following addition of (NH4) 2SO4, NH4NO3, or Ca(NO3)2 by broadcast, in broad band, or in narrow band. The NH4 and NO3 contents in soil decreased rapidly even under narrow band placements. Considerable nitrate movement was observed. After 1 year, neither the total nor the inorganic N level in the fertilized plots was significantly different from that of the control. High salinity was detected under the narrow band placements, but the level diminished rapidly with time. Little salinity was evident under the broad band or broadcast placements. However, the acidity produced by the ammonium fertilizers persisted after 1 year. Changes in soil properties under narrow bands were drastic, whereas changes under broad bands were insignificant. (Skogerboe-Colorado State)
W74-10343

3D. Conservation In Domestic and Municipal Use

EVALUATION AND IMPLEMENTATION OF URBAN DRAINAGE AND FLOOD CONTROL PROJECTS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6B.
W74-09802

A PRELIMINARY REPORT ON URBAN HYDROLOGY AND URBAN WATER RESOURCES: OAHU, HAWAII,
Hawaii Unin., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 2A.
W74-09803

VACUUM SEWAGE TRANSPORT AND TREATMENT IN RURAL AREAS IN DENMARK,
Electrolux A/S (Denmark).
For primary bibliographic entry see Field 5D.
W74-10175

3E. Conservation In Industry

ECONOMIC ANALYSIS OF WATER SUPPLY NEEDS AND ALTERNATIVES IN A MULTI-COUNTY INDUSTRIAL AREA,
Clemson Univ., Dept. of Agricultural Economics and Rural Sociology.
For primary bibliographic entry see Field 6D.
W74-09808

PROJECT RIO BLANCO: PROMPT ECOLOGICAL EFFECTS RESULTING FROM GROUND MOTION,
Geonuclear Corp., Las Vegas, Nev.
For primary bibliographic entry see Field 5C.
W74-09831

ELECTRICAL ENERGY AND ITS ENVIRONMENTAL IMPACT - PROGRESS REPORT, DECEMBER 31, 1972.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5C.
W74-09836

RADIOLOGICAL MONITORING PROGRAM--PERIOD COVERING MAY 17, 1973, THRU JULY 31, 1973, FOR CER GEONUCLEAR CORPORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Sante Fe, N.Mex. Santa Fe Lab.
For primary bibliographic entry see Field 5B.
W74-09878

INTEGRATED SYSTEMS FOR UTILIZING WASTE HEAT FROM STEAM ELECTRIC PLANTS,
Oregon State Univ., Corvallis. Dept. of Soil Science.
For primary bibliographic entry see Field 5D.
W74-09920

WATER DEMANDS FOR EXPANDING ENERGY DEVELOPMENT,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 6D.
W74-09949

HIGH-RATE FILTRATION,
CH2M/Hill, Corvallis, Oreg.
For primary bibliographic entry see Field 5D.
W74-10015

THE PUDSEY PROJECT,
For primary bibliographic entry see Field 5D.
W74-10041

REUSE AND RECYCLE OF WATER IN INDUSTRY,
Bostock, Hill and Ribgy Birmingham, (England).
For primary bibliographic entry see Field 5D.
W74-10051

OUTER CONTINENTAL SHELF OFF FLORIDA--POSSIBLE OIL AND GAS LEASING.
Department of the Interior, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10061

A THEORETICAL STUDY OF GEOTHERMAL ENERGY EXTRACTION,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 4B.
W74-10087

3F. Conservation In Agriculture

IMPROVING WATER MANAGEMENT EFFICIENCY THROUGH USE OF BIO-INDICATORS,
Kansas Agricultural Experiment Station, Manhattan.
For primary bibliographic entry see Field 2D.
W74-09804

PRELIMINARY OBSERVATIONS ON THE USE OF FERTIGATION... NEBRASKA STYLE,
R. R. Volk.
Irrigation Age, Vol 6, No 8, p 28-29, 32, March, 1972. 1 fig, 1 tab.

Descriptors: *Fertilization, *Application methods, Crop response, Corn(Field), *Irrigation, Timing, Farm management, *Nebraska, Clay loam.

A study of present forms of fertilizer application vs. 'fertigation' was carried out at the University of Nebraska Mead Field Laboratory in the summer of 1971 on a silty clay loam soil. The study compared sidedress and irrigation water applied nitrogen solution. All plots received equal amounts of water and were planted to the same hybrid corn. Sprinkler applied nitrogen was uniformly extracted throughout the soil profile by the corn plants in all treatments. The check had the highest amount of nitrates removed at the four foot depth. This means the corn was in need of more nitrogen and the amount of starter supplied was not sufficient. The study did not determine yield differences between sidedress and irrigation water applied nitrogen. (Skogerboe-Colorado State)
W74-09814

ARID ZONE IRRIGATION,
B. Yaron, E. Danfors, and Y. Vaadia.
Springer-Verlag, New York Heidelberg, Berlin. 1973. 434 p.

Descriptors: *Arid lands, *Irrigation, *Irrigation practices, Salinity, Salt balance, Soil chemistry, Soil physics, *Soil-water-plant relationships, *Water requirements.

Irrigation fundamentals in arid and semi-arid zones are presented. The basic principles governing irrigation technology are described. This book, written by a large number of specialists and covering a broad spectrum of different disciplines, is a synthesis of general up-to-date information, and the results of the author's own research. Topics include water resources, soil-water-plant relationships, chemistry of irrigated soils, field investigations, soil and water salinity, irrigation practices and crop water requirements. (Skogerboe-Colorado State)
W74-09815

DRAINAGE AND WATER MANAGEMENT IN HUNGARY,
Agricultural Research Service, Riverside, Calif.
For primary bibliographic entry see Field 2G.
W74-09816

DO I REALLY NEED TO IRRIGATE TODAY, PART 1,
C. H. Davis.
Irrigation Age, Vol 6, No 7, p 61-62, 64, February, 1972. 1 fig.

Descriptors: *Irrigation practices, *Soil moisture, Crop response, Irrigation, Irrigation design, Timing.

A non-technical method for determining when to irrigate is presented. The method is based on average soil moisture holding capacity for soil types. The moisture content is determined using electronic soil moisture probes. (See also W74-09819) (Skogerboe-Colorado State)
W74-09818

DO I REALLY NEED TO IRRIGATE TODAY, HOW MUCH WATER FOR THIS IRRIGATION,
C. H. Davis.
Irrigation Age, Vol 6, No 8, p 20, 22, 26, March, 1972. 2 fig, 1 tab.

Descriptors: *Irrigation practices, *Irrigation programs, Soil moisture, Crop response, Irrigation systems, Irrigation water, Stress.

A non-technical method for estimating the amount of water required for a given irrigation is presented. The method is based on estimates of the water holding capacity of a soil according to the basic soil texture. Soil moisture content is determined by the feel of the soil or by electronic moisture meters. (See also W74-09818) (Skogerboe-Colorado State)
W74-09819

SPRINKLIGATION AS SEEN AND DONE BY THE OPERATOR...THE MAN AND THE QUALITY OF THIS LABOR DETERMINES THE SUCCESS OF THE SPRINKLER IRRIGATION OPERATION,
Irrigation Age, Vol 6, No 6, p 10-24, January, 1072. 12 fig,

Descriptors: *Irrigation practices, Surface irrigation, *Sprinkler irrigation, *Irrigation systems, Irrigation design, *Application equipment.

The field of sprinkler irrigation is reviewed. The various types of systems are discussed including: hand move, solid set, wheel move, and center pivot systems. The importance of proper management is stressed. (Skogerboe-Colorado State)
W74-09820

IRRIGATION, DRAINAGE AND SALINITY.
For primary bibliographic entry see Field 3C.
W74-09821

DRIP IRRIGATION DEVELOPER IN ISRAEL MAKES DEAL TO MARKET SYSTEM IN U.S.
Irrigation Age, Vol 6, No 7, p 14-16, 39-40, February, 1972.

Descriptors: *Irrigation practices, *Irrigation systems, Surface irrigation, Irrigation, Irrigation design, United States.
Identifiers: *Israel, *Trickle-root irrigation.

A new development in irrigation, developed and perfected in Israel, will be introduced on a major scale in the United States. Symcha Blass of Tel

Aviv, originator of trickle-root irrigation widely utilized in Israel and the Netafim Drip Irrigation firm, its manufacturer, signed a licensing agreement in September with industrialist Howard Klein of Washington, D.C., who heads an agro-technical organization formed to install this system throughout the United States. (Skogerboe-Colorado State)
W74-09822

EFFECTS OF SURFACTANTS APPLIED TO SAMPLES OF SOLONETZ SOIL ON WATER PENETRATION AND PLANT GROWTH,
Department of Agriculture, Vegreville (Alberta). Solonetzic Soil Sub-Station.
R. R. Cairns.
Can J Soil Sci. Vol 52 No 2 p 267-269, 1972.
Identifiers: *Barley, Growth, Magnesium, Potassium, *Surfactants, Toxicity, Uptake, *Solonetz soils, Sampling.

The results of a study do not support the idea that surfactants in general might increase the rate of water penetration into Solonetz soil, but do indicate that their application at substantial rates could cause problems in plant nutrition. There was generally a toxic reaction in barley seedlings, K and Mg uptake were lowered.--Copyright 1973, Biological Abstracts, Inc.
W74-10044

COST OF RURAL COMMUNITY WATER AND SEWER SYSTEMS COMPARED TO PRIVATE SYSTEMS,
South Dakota State Univ., Brookings. Agricultural Cooperative Extension Service.
For primary bibliographic entry see Field 6C.
W74-10098

THE STATES ENTER THE RURAL WATER PICTURE,
Conset, Inc., Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10106

FEEDLOT WASTE MANAGEMENT: PROGRESS AND OUTLOOK,
Texas A and M Univ., College Station. Dept. of Agricultural.
For primary bibliographic entry see Field 5D.
W74-10133

A SIMILARITY DURING EARLY STAGES OF RAIN INFLITRATION,
Hawaii Univ., Honolulu. Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W74-10205

TIME-DEPENDENT LINEARIZED INFILTRATION. I. POINT SOURCES,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
For primary bibliographic entry see Field 2G.
W74-10217

PREDICTION OF WATER LOSS FROM A FALLOW FIELD SOIL BASED ON SOIL WATER FLOW THEORY,
Agricultural Research Service, Fort Collins, Colo.
For primary bibliographic entry see Field 2D.
W74-10218

METHODS OF CALCULATION OF EVAPORATION AND WATER REGIME IN THE ROOT ZONE OF SOIL ON WATERSHED (METODY RASCHETA ISPARENIYA I VODNOGO REZHIMA KORNEOBITAYEMOGO SLOYA POCHVY NA VODOSBORAKH),
For primary bibliographic entry see Field 2D.
W74-10227

REFLECTANCE OF VEGETATION, SOIL, AND WATER,
Agricultural Research Service, Weslaco, Tex.
For primary bibliographic entry see Field 7B.
W74-10252

UNCERTAINTY ANALYSIS IN THE ECONOMIC EVALUATION OF IRRIGATION SYSTEMS,
Bradford Univ. (England).
D. Nudds, I. G. Simpson, and A. Bottomley.
The Institution of Civil Engineers, Proceedings, Part 2, Research and Theory, Vol 55, p 659-664, September 1973. 4 fig, 1 tab.

Descriptors: *Irrigation programs, *Irrigation efficiency, *Probability, *Risks, Evaluation, Monte Carlo methods, Measurement, Crops, Prices, Costs, Mathematical models, Systems analysis.
Identifiers: *Economic analysis.

Economic analysis is made of an Arabian irrigation scheme, using the standard approach of comparing different scheme designs by producing a single figure as a measure of the worth of the project, in this case the scheme's internal rate of return (IRR). The IRR is calculated from a theoretical model of the system, involving estimated values for such quantities as areas irrigated, water flows, efficiencies, yields, costs, and prices. Each data item is set at its estimated value. Probabilistic streamflow data are subjected to statistical analysis to obtain estimates for the areas under cultivation. The final IRR calculated is an average value based on most likely and mean values.. In the end, therefore, a number is obtained that is valid for comparing similar scheme designs, but which cannot be the IRR and which cannot be described as the most likely or mean IRR; it is a number calculated from most likely or mean data. This distinction arises from three causes, two of which are dealt with here: (1) the estimated data values used in the calculation will not be all correct in practice; and (2) the areas irrigated each year will not be the mean areas which form the basis of the calculations. Risk analysis is performed to examine and quantify the effects of these causes. Monte Carlo methods are utilized to quantify the variability in the actual data flow. (Bell-Cornell)
W74-10321

SUBSURFACE IRRIGATION IN HAWAIIAN SUGARCANE,
Hawaiian Sugar Planters' Association Experiment Station, Honolulu.
C. M. Vaziri.
Paper No 72-740 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972, Chicago, Illinois. 11 p, 6 fig, 5 tab.

Descriptors: *Irrigation, *Subsurface irrigation, Irrigation practives, *Sugarcane, *Hawaii, Irrigation engineering.

The first successful subsurface irrigation system for sugarcane was installed on March 29, 1970, at HSPA Kunia Substation in an 8,000 square foot area. The field was harvested on November 3, 1971. After harvest, the system was inspected and found to be functioning adequately. Field results indicate water savings and yield increase. (Skogerboe-Colorado State)
W74-10326

CULTURAL PRACTICES FOR IRRIGATED WINTER WHEAT PRODUCTION,
Southwestern Great Plains Research Center, Bushland, Tex.
P. W. Unger, R. R. Allen, and J. J. Parker.
Soil Science Society of America Proceedings, Vol 37, No 3, p 437-442, May-June, 1973. 5 tab, 21 ref.

Descriptors: *Cultivation, *Irrigation, Infiltration, Efficiencies, Organic matter, *Nitrogen, Bulk density, *Wheat, Water utilization, *Fertilizers.

Rotötilling, moldboard plowing, disking, burn-listing, and listing were satisfactory tillage methods for managing the residues produced by continuous irrigated winter wheat. Grain yields averaged highest for moldboard plowing and lowest for lister plowing. Nitrogen fertilizer at 90 or 135 kg N/ha resulted in significant grain and residue yield differences in a few years, but no consistent trends were apparent. Irrigation water infiltration was highest for moldboard plowing and lowest for lister plowing. The list and burn-list treatment resulted in similar infiltration. Water-use efficiencies were similar for all treatments. At the end of the 5-year study, soil organic matter content was lowest (1.66%) for burn-lister tillage and highest (1.72%) for lister and disk tillage. Water-stable aggregation was highest (84.5%) for rototilling and lowest (79.3%) for burn-lister tillage. Bulk density increased in all plots, but it increased the least in plots that were moldboard plowed. (Skogerboe-Colorado State)
W74-10327

PRINCIPLES OF MANAGING HIGH FREQUENCY IRRIGATION,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
S. L. Rawlins.
Soil Science Society of America Proceedings, Vol 37, No 4, p 626-629, July-August, 1973. 3 fig, 6 ref.

Descriptors: *Irrigation practices, *Irrigation, Irrigation systems, Irrigation design, Sprinkler irrigation, Soil physics, Soil science.

The consequences of increasing irrigation frequency are explored, taking into consideration the laws giverning water flow in soil. As frequency increases, the waterholding capacity of the soil becomes less important because water is supplied as the plants require it. Soil water content, and therefore matric potential, are continuously high and only slightly dependent upon deep percolation rate. This makes the need for deep percolation to leach salts the only valid criterion for applying more water than the plants transpire. The need to apply extra water to those crops that require high soil water content is eliminated. Controlling the deep percolation rate rather than the soil water status requires measurements of flux rather than water potential as inputs for managing the quantity of water to be applied. (Skogerboe-Colorado State)
W74-10331

SOIL MULCH EFFECTS ON SEEDBED TEMPERATURE AND WATER DURING FALLOW IN EASTERN WASHINGTON,
Agricultural Research Service, Pullman, Wash. Soil and Water Conservation Research Div.
R. I. Papendick, M. J. Lindstrom, and V. L. Cochran.
Soil Science Society of America Proceedings, Vo 37, No 2, p 307-314, March-April, 1973. 8 fig, tab, 23 ref.

Descriptors: *Mulching, *Dry farming, *Wheat Temperature, Thermal insulation, *Cultivation Unsaturated flow, Evaporation, *Washington.

Depth of dry soil mulch affected summer soil tem peratures and seed-bed water at the end of fallo in the dryland wheat region of eastern Washing ton. Increasing the depth of the tillage mulch fro 6 to 11 cm reduced summertime seed zone dryin sufficiently to benefit wheat emergence. Reduc tion of drying was greatest when the seed zone ha good capillary continuity with the deeper so layers. Drying depth and intensity was greater wi a cloddy soil mulch than with a fine mulch. Th seed zone water-conserving effect of a fine so mulch was related to the lowered temperature and temperature gradients across the seed zone a sociated with the increased mulch depth. Th deeper soil mulch conserved seedbed wat through increased resistance to water flow fro

moist layers to the atmosphere, and through increased thermal insulation of the moist soil below the dry mulch. Surface-applied straw decreased seed-zone temperatures under the shallow mulch only. (Skogerboe-Colorado State)
W74-10333

COMPARATIVE YIELD AND FERTILIZER EFFICIENCY OF NO-TILLAGE AND CONVENTIONALLY TILLED CORN,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
W. W. Moschler, G. M. Shear, D. C. Martens, G. D. Jones, and R. R. Wilmouth.
Agronomy Journal, Vol 64, No 2, p 229-231, March-April, 1972. 3 tab, 13 ref.

Descriptors: *Cultivation, *Corn(Field), Fertilization, *Fertilizers, Leaching, Nitrogen, Phosphorus, Potassium, Efficiencies, *Crop production.

Surface application of fertilizer for no-tillage corn is the most convenient method. The relative efficiency of fertilizer applied in this manner has been undetermined, however. Field experiments on three soil type in Virginia suggest that fertilizer efficiency for no-tillage corn with surface application was higher than for conventionally tilled corn with an equal disked-in application. No-tillage resulted in a 9-year average yield increase of 25.6% on Lodi salt loam, a 6-year average increase of 13.7% on Davidson clay loam, and a 5-year average increase of 39.0% on Cecil clay loam. In addition to increased yields, larger amounts of residual N, P, and K, as well as organic matter, were found in no-tillage soil in several cases. (Skogerboe-Colorado State)
W74-10335

RESPONSE OF CORN TO TIME AND RATE OF PHOSPHORUS AND ZINC APPLICATION,
West Virginia Univ., Morgantown. Div. of Plant Sciences.
R. F. Keefer, R. N. Singh, D. J. Horvath, and P. R. Henderlong.
Soil Science Society of America Proceedings, Vol 36, No 4, p 628-632, July-August, 1972. 5 fig, 8 tab, 23 ref.

Descriptors: *Nutrients, *Corn(Field), *Crop response, *Phosphorus, *Zinc, Soil chemistry, Fertility, *Fertilization, Fertilizers.

Corn was grown in the greenhouse on two soils--Monongahela, a Typic Fragiudult (I) and Wharton, an Aquic Hapludult (II), which differed in available Zn, available P, exchangeable Mg, total Zn, and organiz matter (OM). Dry matter yield and Zn concentration and content of plant parts were increased where Zn either as ZnSO4 or ZnEDTA was applied with P regardless of time to soil I. Zinc-EDTA seemed to be a better source of Zn since it increased Zn concentration in leaves and stems more than ZnSO4 on soil I. However, with soil II, response to ZnSO4 application was obtained only when P was applied at high rates 8 weeks before planting. Application of ZnEDTA produced no significant response by corn on soil II, probably due to instability of ZnEDTA under acid conditions resulting in appreciable amounts going fixed on clays in this soil. The relative response to Zn with increasing levels of P was greater on soil I than on soil II. Addition of Zn in the former decreased the percent P and P content in both leaves and stems at high levels of P application, however, application of Zn to all the latter did not show any noticeable affect on percent P at all levels of P application. (Skogerboe-Colorado State)
W74-10337

RESPONSE OF IRRIGATED CORN TO TIME, RATE, AND SOURCE OF APPLIED N ON SANDY SOILS,
Wisconsin Univ., Madison. Dept. of Agronomy.
P. E. Jung, Jr., L. A. Peterson, and L. E. Schrader.
Agronomy Journal, Vol 64, No 5, p 668-679, September-October, 1972. 6 tab, 6 ref.

Descriptors: *Fertilization, *Nitrogen, *Crop response, *Corn(Field), Nutrient removal, Nitrogen compounds, Fertility, *Sands, Soils, *Wisconsin.

Three sources of N were applied to corn at four rates and six times of application in all combinations. 'Wisconsin 273' and 'Wisconsin 433' corn were grown. Response was measured as grain yield, tissue yield, percentage N in tissue, percentage N in grain, and N uptake. The N applied during either the 5th, 6th, 7th, or 8th week after planting was the most effective as shown by increased grain and tissue yields. Nitrogen applied after the 8th week was associated with a distinct reduction in N uptake and grain and tissue yields. Generally, percentage N in the grain and tissue increased with later N applications. Nitrate reductase (NR) activity in the leaves and percentage N in grain and tissue increased with increasing rate of applied N. Yields of grain and tissue for Wisconsin 273 and Wisconsin 433 leveled off at the 112 and 168 kg/ha rates of N, respectively. (Skogerboe-Colorado State)
W74-10338

RELATION BETWEEN EVAPOTRANSPIRATION RATE AND MAIZE YIELD,
Hebrew Univ., Rehovoth (Israel). Dept. of Agriculture.
For primary bibliographic entry see Field 2D.
W74-10339

SENSITIVITY OF SOUTHERN PEAS TO PLANT WATER DEFICIT AT THREE GROWTH STAGES,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
E. A. Hiler, C. H. M. van Bavel, M. M. Hossain, and W. R. Jordan.
Agronomy Journal, Vol 64, No 1, p 60-64, January-February, 1972. 8 fig, 2 tab, 12 ref.

Descriptors: *Moisture stress, *Peas, *Soil moisture, Water utilization, Efficiencies, Leaves, *Moisture deficit.

Response of southern peas to different levels of water deficit at three different stages of growth was measured in a greenhouse. In each stage, plants were stressed to three levels of leaf water potential: -14 bars, -21 bars, and -28 bars. Crop susceptibility factors were determined for each stage of growth and level of plant water deficit. The flowering period was found to be the most sensitive stage, regardless of deficit level. The pod development stage was found to be least sensitive to level of deficit. A water deficit of -28 bars, however, caused a yield reduction of greater than 50% for all growth stages. Stress-day index values were calculated and related to crop yield. The use of the stress-day index concept in irrigation scheduling is discussed. (Skogerboe-Colorado State)
W74-10340

COMBINING EXPERIMENTS TO PREDICT FUTURE YIELD DATA,
Cornell Univ., Ithaca, N.Y.
F. B. Cady, and D. M. Allen.
Agronomy Journal, Vol 64, No 2, p 211-214, March-April, 1972. 3 fig, 2 tab, 6 ref.

Descriptors: *Regression analysis, *Yield equations, Soil tests, *Fertility, Fertilization, *Crop production.

Data from a series of fertility experiments including uncontrolled environmental variables are analyzed so that future yields may be predicted. A new criterion, the prediction sum of squares, based on the performance of the estimated equation for predicting observations not included in the least squares estimation, is developed for selecting the best predictor variables. The procedure gives an estimated prediction equation with a minimal number of predictor variables, including few interaction variables. Agronomically reasonable estimates of the regression coefficients also are obtained. Using the new procedure, a 30% reduction in the sum of squared deviations between the observed and the predicted observations compared with the stepwise regression method is found. Response curves are constructed for use in making soil test recommendations. (Skogerboe-Colorado State)
W74-10344

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

EVALUATION AND IMPLEMENTATION OF URBAN DRAINAGE AND FLOOD CONTROL PROJECTS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6B.
W74-09802

APPLICATION OF THE LUNR INVENTORY SYSTEM FOR WATER RESOURCES PLANNING AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN,
Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
For primary bibliographic entry see Field 6B.
W74-09807

ECONOMIC ANALYSIS OF WATER SUPPLY NEEDS AND ALTERNATIVES IN A MULTI-COUNTY INDUSTRIAL AREA,
Clemson Univ., Dept. of Agricultural Economics and Rural Sociology.
For primary bibliographic entry see Field 6D.
W74-09808

ARID ZONE IRRIGATION,
For primary bibliographic entry see Field 3F.
W74-09815

DRAINAGE AND WATER MANAGEMENT IN HUNGARY,
Agricultural Research Service, Riverside, Calif.
For primary bibliographic entry see Field 2G.
W74-09816

DEVELOPMENT OF BI-LEVEL DRAINAGE THEORY,
South Dakota State Univ., Brookings.
D. W. DeBoer, and S. T. Chu.
Paper No 72-731 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972 Chicago, Illinois. 12 p, 4 fig, 6 ref.

Descriptors: *Drainage, *Surface drainage, *Subsurface drainage, *Tile drainage, Crop response, Soil water, Drainage engineering, Soil water movement.
Identifiers: *Bi-level drainage.

Two analytical solutions were derived for the bi-level drainage problem. The two solutions, based on the Dupuit-Forchheimer assumptions, are for the steady state and falling water table conditions. These solutions should be applicable to the design of subsurface drainage systems with drain lines at

two elevations on an alternating basis. (Skogerboe-Colorado State)
W74-09817

DO I REALLY NEED TO IRRIGATE TODAY, PART 1,
For primary bibliographic entry see Field 3F.
W74-09818

SPRINKLIGATION AS SEEN AND DONE BY THE OPERATOR...THE MAN AND THE QUALITY OF THIS LABOR DETERMINES THE SUCCESS OF THE SPRINKLER IRRIGATION OPERATION,
For primary bibliographic entry see Field 3F.
W74-09820

IRRIGATION, DRAINAGE AND SALINITY.
For primary bibliographic entry see Field 3C.
W74-09821

DRIP IRRIGATION DEVELOPER IN ISRAEL MAKES DEAL TO MARKET SYSTEM IN U.S.
For primary bibliographic entry see Field 3F.
W74-09822

NUMERICAL EXPERIMENT FOR SOLVING COMPLETE EQUATIONS OF HYDRODYNAMICS,
For primary bibliographic entry see Field 2B.
W74-09898

REGIONAL FLOOD MAPPING FROM SPACE,
National Aeronautics and Space Administration, Greenbelt, Md.
For primary bibliographic entry see Field 7C.
W74-09906

EXPECTED RANGE AND ADJUSTED RANGE OF HYDROLOGIC SEQUENCES,
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
J. D. Salas-La Cruz, and D. C. Boes.
Water Resources Research, Vol 10, No 3, p 457-463, June 1974. 7 fig, 15 ref. NSF Grant GK-11564.

Descriptors: *Stochastic processes, *Streamflow forecasting, *Reservoir yield, Water storage, Statistics, Statistical methods, Reservoir storage, Water management(Applied).

Because of the stochastic nature of hydrologic sequences such as streamflow the needed capacity of a reservoir is a random variable. Studies of storage capacity of reservoirs, under the assumption of infinite storage, lead to the problem of finding the distribution of the range or adjusted range of partial sums. Both the expected range and the expected adjusted range can be obtained from a single formula by changing an appropriate parameter. A general formula is given for the expected range and expected adjusted range for any set of exchangeable random variables and for any degree of development. (Knapp-USGS)
W74-09908

EFFECT OF SKEWNESS IN THREE STOCHASTIC PENTAD RIVER FLOW MODELS ON CROSSING PROPERTIES OF SYNTHESIZED DATA,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W74-09909

SURFACE WATER NETWORK DESIGN BY REGRESSION ANALYSIS SIMULATION,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 2E.
W74-09912

FLOODS FROM SMALL DRAINAGE AREAS IN CALIFORNIA--A COMPILATION OF PEAK DATA, OCTOBER 1958 TO SEPTEMBER 1973,
Geological Survey, Menlo Park, Calif.
A. O. Waananen.
Geological Survey Data Report, December 12, 1973. 261 p, 67 fig, 4 tab.

Descriptors: *Floods, *Small watersheds, *California, *Hydrographs, *Data collections, Hydrologic data, Flood frequency, Peak discharge, Storm runoff, Basic data collections.

Annual peak discharges at 332 sites on small drainage areas in California, and flood hydrographs and precipitation data at 66 sites were obtained during the period October 1958 to September 1973. These basic data were obtained for use in a study of flood frequency for small streams. A summary of storm precipitation and the related volumes of runoff, as represented by the flood hydrographs, is included. (Knapp-USGS)
W74-09940

HYDROGRAPHY OF THE CHESAPEAKE AND DELAWARE CANAL,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
D. W. Pritchard, and G. B. Gardner.
Chesapeak Bay Institute Technical Report 85, Johns Hopkins University (Reference 74-1), February 1974. 171 p, 5 fig, 13 tab, 1 append.

Descriptors: *Canals, *Water quality, *Water circulation, Estuaries, *Salinity, Open channel flow, Dredging, Streamflow, Chesapeake Bay, Delaware River.
Identifiers: *Chesapeake and Delaware Canal.

Temperature, salinity, and water velocity were measured in the Chesapeake and Delaware Canal between May 1969 and February 1973 to determine the effect of the enlargement of the Canal on the transport of water and on the salinity distribution in the Canal and adjacent areas of the Chesapeake Bay and Delaware River. Conditions in the Canal are usually marked by large, short-term fluctuations. The best estimate for the long-term average transport is 988 cfs before enlargement, and 2,450 cfs after enlargement, both toward the Delaware. The salinity generally increases from west to east through the Canal. The values range from essentially fresh in the western end during the period of high flow from the Susquehanna, to about 0.8% in the eastern portion during low flow conditions. (Knapp-USGS)
W74-09944

HYDROLOGIC DATA OF THE NEPONSET AND WEYMOUTH RIVER BASINS, MASSACHUSETTS,
Geological Survey, Boston, Mass.
R. A. Brackley, W. B. Fleck, and R. E. Willey.
Geological Survey open-file report, 1973. 51 p, 1 fig, 1 plate, 6 tab, 12 ref.

Descriptors: *Basic data collections, *Massachusetts, *Groundwater, *Surface waters, *Hydrologic data, Data collections, Water quality, Discharge(Water), Water wells.
Identifiers: Neponset River(Mass), Weymouth River(Mass).

Hydrologic data were collected in the Neponset, Weymouth Fore, and Weymouth Back River basins in eastern Massachusetts south of Boston. Water resources were studied in the areas of these basins that are upstream from tide effect or heavy urbanization. In addition to streamflow, geologic, groundwater, and chemical water-quality data obtained in the field, information on many wells and borings was supplied by municipal and state agencies. The data include streamflow, drillers' logs, water analyses, and well yields. (Knapp-USGS)
W74-09945

NETWORK FLOW MODELING OF MULTIRESERVOIR DISTRIBUTION SYSTEMS,
Texas Univ., Austin. Center for Research in Water Resources.
G. Bhaumik, W. Driscoll, and P. Jensen.
Available from the National Technical Information Service as PB-233 927 $5.50 in paper copy, $1.45 in microfiche. Technical Report No CRWR-107, June 1974, 151 p, 31 fig, 7 tab, 85 ref, 2 append. OWRR B-107-TEX (1) 14-31-0001-3656.
Identifiers: *Networks, Flow, *Model studies, Reservoirs, *Distribution, Optimization, Evaporation, Economics, *Algorithms, *Water loss, Risks, Water supply, *Optimum development plans, *Multiple-purpose reservoirs, *Reservoir operation.

The operating policy for a multireservoir distribution system is determined by many factors including benefits and priorities for the current use of water, size and use limitations of the facilities of the system, costs and delays in transmitting water through the system, and the current and future weather. Some of these factors have been modeled using a network flow model which allows determination of optimum policies for complex systems. This report describes three extensions to the current modeling capabilities. The first part discusses the water losses which occur in the system and proposes a computerized algorithm which can solve networks with losses. The second part treats the same problem but derives a much more efficient algorithm. The third part considers the uncertainty inherent in estimates of future water supplies and demands and provides a representation for this uncertainty for the network model. The general approach is to calculate a mathematical expression which determines the value of water stored for the future. This work expands the generality of the network flow models as related to water systems and also makes contributions to the general theory of network flow analysis.
W74-09952

HUDSON RIVER,
For primary bibliographic entry see Field 5C.
W74-09958

THE LOWER MISSISSIPPI,
For primary bibliographic entry see Field 5C.
W74-09959

SAVANNAH RIVER,
For primary bibliographic entry see Field 5C.
W74-09960

FLOOD PLAIN INFORMATION, OHIO RIVER MONROE COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Monroe County Planning Commission and the State of Ohio Department o Natural Resources, December, 1971. 31 p, 8 fig, 1 plates, 6 tab, glossary.

Descriptors: *Flood plains, *Flood control, *Ohi River, *Flood profiles, *Flood protection, Locks Dams, Flood frequency, Rivers, Tributaries Gages, Gaging, Flood forecasting, Flow, Obstruc tions to flow.
Identifiers: Monroe County(Ohio), Intermedia Regional Flood.

Switzerland, Salem, Ohio, Lee, and Jackso townships and the Village of Clarington are th major population centers of Monroe County located on the right or west bank of the Ohio Riv from Mile 110.85 to Mile 140.50 downstream Pittsburgh, Pa. A moderately wide floodplain ar the relatively low river gradient of the Ohio Riv result in prolonged critical flooding. No tributari in Monroe County have a significant effect flood stages. Gage records have been kept f varying periods since 1911. The main flood seas

is usually December through April. Duration of flooding is relatively long. The major obstructions to flood flows are Locks and Dam 14, 15, and 16 soon to be replaced by the Hannibal Locks and Dam and the Willow Island Locks and Dam, both with gates structures permitting underpassage of flow. Fourteen upstream flood control projects are effective in reducing flood levels 5 to 9 feet. The most serious floods took place on March 19, 1936 from Mile 110.8 to 115.0 and on March 28, 1913 from Mile 115.0 to Mile 140.5. Both floods occurred after abnormally heavy rainfalls and damage was heavy, with water covering major portions of Clarington, Hannibal, Duffy and Fly. The most recent major flood, March 11, 1964, crested 6.9 feet above the gage reading of 41 feet which defines a major flood on the Ohio River. Based on previous gage records, a projected Intermediate Regional Flood (detailed on plates) would have a peak discharge of 390,000 cu. ft./sec. and a reach elevation of 637.0 m.s.l. at Hannibal Locks and Dam upper gage. Flood areas delineating the Intermediate Regional Flood, the 1913 flood and normal pool are shown on topographic maps. (LaPointe-North Carolina)
W74-09965

FLOOD PLAIN INFORMATION, OHIO RIVER: JEFFERSON COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Jefferson County Planning Commission and The State of Ohio Department of Natural Resources, December, 1971. 33 p, 9 fig, 15 plates, 6 tab, glossary.

Descriptors: *Flood plains, *Flood control, *Ohio River, *Flood profiles, *Flood protection, Locks, Dams, Flood frequency, Rivers, Tributaries, Gages, Gaging, Flood forecasting, Flow, Obstructions to flow.
Identifiers: Jefferson County(Ohio), Intermediate Regional Flood, Steubenville(Ohio), Pike Island Lock and Dam, New Cumberland Lock and Dam.

Empire, Toronto, Steubenville, Mingo Junction, Brilliant, Rayland, Tiltonsville and Yorkville are the major cities of Jefferson County, located on the right or west bank of the Ohio River from Mile 99.8 to Mile 83.7 downstream of Pittsburgh, Pa. Above Jefferson County the Ohio River has a moderately wide floodplain and a relatively flat river gradient. In the Jefferson County reach the valley floor varies in width from 0.4 mile to 0.7 mile and there are no tributaries that have a significant effect on flood stages. The main flood season is usually December through April and duration of flooding is relatively long. Pike Island Locks and Dam and New Cumberland Locks and Dam control flood flows in the report reach. Fourteen upstream flood control projects are effective in reducing flood levels from 6 to 9 feet. The most serious recorded flood occurred on March 19, 1936 after 2 days of heavy rains (1-6 inches), with Steubenville and Yorkville about 40% covered by water while Stratton, Empire, Mingo Junction, Brilliant, Rayland and Tiltonsville were almost completely covered. Damage was estimated in the millions of dollars. A flood of lesser gravity took place on December 31, 1942. Damage was estimated in the millions. Stratton, Empire, Brilliant and Rayland suffered the heaviest damage. The most recent major flood, on March 11, 1964, crested at 5.9 feet above major flood stage at New Cumberland. A projected Intermediate Regional Flood (IRF) based on previous gage records would have a peak discharge of 405,000 cubic feet per second and would reach an elevation of 680.3 m.s.l. at New Cumberland Locks and Dam Upper Gage as detailed in topographic maps. (LaPointe-North Carolina)
W74-09966

FLOOD PLAIN INFORMATION, MONONGAHELA RIVER: NORTH CHARLEROI, SPEERS, DUNLEVY, ALLENPORT, STOCKDALE, ROSCOE, AND ELCO, WASHINGTON COUNTY, PENNSYLVANIA.
Army Engineer District, Pittsburgh, Pa.
Prepared for Communities along the Monongahela River from North Charleroi to Elco and The Washington County Planning Commission, March, 1970. 43 p, 7 fig, 27 plates, 6 tab, glossary.

Descriptors: *Flood plains, *Flood control, Floods, *Flood profile, *Flood protection, Flood frequency, Tributaries, Gages, Flood forecasting, Flow, Obstructions to flow, *Pennsylvania.
Identifiers: Washington County(Pa.), *Monongahela River(Pa.), Intermediate Regional Flood, Standard Project Flood, Tygart Dam(W. Va.).

Intended to provide a basis for future study and planning, a record is presented of the largest known floods on the Monongahela between North Charleroi and Elco, and probable future floods are discussed. Solution of flood problems is not included. Located on comparatively high ground, most residential sections have escaped serious damage, although some business and industrial sections in low lying areas have been flooded. The Monongahela River watershed above North Charleroi consists of relatively narrow valleys with steep hillside slopes conducive to rapid initial runoff. In the 9.2 mile reach studied, the river valley is 0.5 miles wide with the river slope 0.8 ft./mi. with no significant tributaries. Gage records have been maintained since 1885. The only major obstruction of flood flows is Locks and Dam 4, a gated structure allowing almost unimpeded flow when the gates are wide open. Operations of Tygart Dam and Reservoir near Grafton, West Virginia, upstream of Washington County, has reduced flood peaks an average of 4 feet. Two flood control dams are authorized for construction, one at Rowlesburg, Va. on Cheat River, and one above Weston on West Fork River. Main flood season is usually December through April. Major floods occurred on March 18, 1936, March 7, 1967, and March 5, 1963, all resulting from heavy spring rainfall augmented by snowmelt,. Based on gage records, complete flood profiles were compiled for hypothetical Intermediate Regional and Standard Project Floods. (LaPointe-North Carolina)
W74-09967

FLOOD PLAIN INFORMATION, OHIO RIVER: BELMONT COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Belmont County Planning Commission and The State of Ohio Department of Natural Resources, June 1971. 31 p, 10 fig, 12 plates, 6 tab, glossary.

Descriptors: *Flood plains, *Flood control, *Ohio River, *Flood profiles, *Flood protection, Locks, Dams, Flood frequency, Flood forecasting, Obstructions to flow.
Identifiers: Belmont County(Ohio), Intermediate Regional Flood.

Martins Ferry, Bridgeport, Bellaire, Shadyside, and Powhatan Point, all having concentrated residential and industrial development on the flood plain, are the major towns in Belmont County, Ohio, which is situated on the west bank of the Ohio River from Mile 83.7 to Mile 110.9 downstream of Pittsburgh, Pa. Above Belmont County, the Ohio River has a moderately wide flood plain and a relatively flat river gradient (0.6 ft./mi. in the report reach). In the Belmont County reach there are no tributaries that have a significant effect on flood stages. Main flood season is December through April with flood duration for relatively long periods. Major obstructions to flood flows are Pike Island Locks and Dam, equipped with gates allowing underpassage of flow, and Locks and Dams 12, 13, and 14, which will soon be replaced by Hannibal Locks and Dam, a similarly gated structure. Thirteen upstream flood control projects operated by the Corps of Engineers are effective in reducing flood levels in Belmont County from 6 to 9 feet. The most serious recorded flood for this area occurred on March 19, 1936. Two days of heavy rains created damage estimated in the millions of dollars. A flood of lesser gravity took place on Dec. 31, 1942. The most recent major flood occurred on March 11, 1964. Using gage records for the past 108 years, the characteristics of an Intermediate Regional Flood were determined. It would have a peak discharge of 390,000 cubic feet per second and would be 1.7 flood feet above the 1964 flood at Hannibal Dam. No plans for the solution of flood problems are provided. (LaPointe-North Carolina)
W74-09968

FLOOD PLAIN INFORMATION, OHIO RIVER: WETZEL COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Wetzel County Planning Commission, and The State of West Virginia Department of Natural Resources, December, 1971. 27 p, 8 fig, 7 plates, 6 tab, glossary.

Descriptors: *Flood plains, *Flood control, *Ohio River, *Flood profile, *Flood protection, Locks, Dams, Flood frequency, Rivers, Tributaries, Gages, Gaging, Flood forecasting, Flow, Obstructions to flow.
Identifiers: Wetzel County(W.Va.), Intermediate Regional Flood.

New Martinsville is the major town of Wetzel County, a sparsely settled region of West Virginia. The county is situated on the left or east bank of the Ohio River from Mile 121.6 to Mile 133.6 downstream of Pittsburgh, Pennsylvania. Above Wetzel County the Ohio River has a moderately wide floodplain and a relatively flat river gradient (a slope of 0.5 ft./mi. in the report reach). In Wetzel County there are no tributaries that have a significant effect on flood stages. The main flood season is usually December through April and duration of flooding is relatively long. The major obstructions to flow are Locks and Dams 15 and 16 which have no control over flood flows. These will be soon replaced by Hannibal Locks and Dam (Mile 126.4) and Willow Island Locks and Dam (Mile 161.7), both of which will be equipped with gates to allow underpassage of flow. Fourteen upstream flood control projects are effective in reducing flood levels in Wetzel County from 5 to 9 feet. The most serious recorded flood for this area occurred on March 28, 1913 after 3 days of heavy rains, creating severe damage. The worst recent major flood occurred March 11, 1964, when flood crest registered 10.2 feet below the 1913 reading at Lock and Dam 15. Based on 60 years of gage records, the characteristics of an Intermediate Regional Flood were projected and shown on topographic maps. It would have a peak discharge of 389,000 cubic ft./sec. and would reach an elevation of 635.5 ft. at Lock and Dam (1.5 ft. above 1964 crest). Plans for solution of flood problems are not included. (LaPointe-North Carolina)
W74-09969

FLOOD PLAIN INFORMATION, OHIO RIVER: MARSHALL COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Marshall County Planning Commission and the State of West Virginia Department of Natural Resources, December, 1971. 32 p, 8 fig, 12 plates, 6 tab, glossary.

Descriptors: *Flood plains, *Flood control, *Ohio River, *Flood profiles, *Flood protection, Locks, Dams, Flood frequency, Gages, Flood forecasting, Flow, Obstructions to flow, *West Virginia.
Identifiers: Marshall County(W.Va.), Intermediate Regional Flood(IRF).

Marshall County is situated on the east bank of the Ohio River from Mile 92.9 to Mile 121.6 downstream of Pittsburgh, Pa. Benwood, McMechen, Glendale and Moundsville, all heavily in-

dustrialized, are the major towns. Above Marshall County, the Ohio River has a moderately wide flood plain and a relatively flat river gradient (a slope of 0.5 ft./mi. for the report reach). No tributaries in Marshall County have a significant effect on flood stages. The main flood season is usually December through April. Duration of flooding is relatively long. The major obstructions to flood flows are Locks and Dams 13, 14, and 15, which have no control over flows. These will be replaced by Hannibal Locks and Dam, equipped with gates allowing underpassage of flow. Thirteen upstream flood control projects are effective in reducing flood levels from 5 to 9 feet. No flood plain regulations or flood proofing building codes are in effect in Marshall County. Most serious recorded floods were the March 19, 1936 flood from Mile 92.9 to Mile 115.0, and the March 28, 1913 flood from Miles 115.0 to 121.6. Damage was estimated in the thousands of dollars. The most recent major flood, with a gage reading of 47.9 at Lock and Dam 14 occurred on March 11, 1964. Using gage records for the past 60 years, the characteristics of an Intermediate Regional Flood were determined with an estimated peak discharge of 389,000 cubic feet per second and an elevation of 637.0 m.s.l. at Hannibal Locks and Dam Upper Gage. Topographic maps illustrate the projected flood profile. No plans for solution of flood problems are provided. (LaPointe-North Carolina)
W74-09970

FLOOD PLAIN INFORMATION, OHIO RIVER: HANCOCK COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Hancock County Planning Commission and the State of West Virginia Department of Natural Resources, December, 1971. 27 p, 6 fig, 12 plates, 5 tab, glossary.

Descriptors: *Flood plains, *Flood control, *Ohio River, *West Virginia, *Flood profiles, *Flood protection, Locks, Dams, Flood frequency, Rivers, Tributaries, Gages, Gaging, Flood forecasting, Flow, Obstruction to flow.
Identifiers: Hancock County(W.Va.), Intermediate Regional Flood(IRF), Pike Island Locks and Dam(W.Va.), New Cumberland Locks and Dam(W.Va.).

Chester, New Cumberland, and Weirton are the major cities of Hancock County, located on the left or east bank of the Ohio River from Mile 40.1 to Mile 64.7 downstream of Pittsburgh, Pa. The Ohio River falls 429 feet in its 981 mile course to the Mississippi River at Cairo, Ill. The Ohio River Basin, Pittsburgh has a 26,967 sq. mi. drainage area. Heavy winter snows and spring rains create the main flood season, December through April, with flooding for relatively long periods. New Cumberland and Pike Island Locks and Dam equipped with gates to allow unimpeded flows control approximately 25 miles of the Hancock County reach of the Ohio River. Fourteen upstream flood control projects are effective in reducing flood levels from 6 to 9 feet. The most serious recorded flood for this area occurred on March 19, 1936 after 2 days of heavy rains (1-6 inches), with damage estimated in the hundreds of thousands of dollars. A flood of lesser gravity took place on December 21, 1942, with heavy damage to homes and industry. The most recent major flood on March 11, 1964, crested at 5.9 feet above major flood stage as recorded at New Cumberland Locks and Dam. A projected Intermediate Regional Flood (IRF) based on previous gage records would have a peak discharge of 405,000 cubic feet per second and would reach an elevation of 680.3 m.s.l. at New Cumberland Locks and Dam Upper Gage. Damage is estimated at $2,000,000. A complete flood profile, indicating lands inundated by the March 1936 flood and areas which would be flooded by an IRF is shown on topographic maps. (LaPointe-North Carolina)
W74-09971

FLOOD PLAIN INFORMATION, OHIO RIVER: COLUMBIANA COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Columbiana County Planning Commission and the State of Ohio Department of Natural Resources, December, 1971. 29 p, 5 fig, 7 plates, 5 tab.

Descriptors: *Flood plains, *Flood control, *Ohio River, *Flood profiles, *Flood protection, Ohio, Locks, Dams, Flood frequency, Rivers, Tributaries, Gages, Gaging, Flood forecasting, Flow, Obstruction to flow.
Identifiers: Columbiana County(Ohio), Intermediate Regional Flood.

East Liverpool and Wellsville, each having much development in the flood plain area, are the major cities of Columbiana County located on the right or west bank of the Ohio River from Mile 39.9 to 49.8 downstream of Pittsburgh, Pa. The Ohio River Valley varies in width from about 0.2 to 0.5 mile with an average slope for the River approximately 1 foot per mile in the study reach. Heavy winter snows and spring rains make the main flood season December through April and flood duration is for relatively long periods. New Cumberland Locks and Dam, equipped with gates to allow underpassage of flow when a flow of 200,000 cubic feet per second is reached, controls all of the Columbiana reach. Fourteen upstream flood control projects are effective in reducing flood levels in Columbiana County from 6 to 9 feet. The most serious recorded flood occurred on March 19, 1936 after 2 days of heavy rains (1-6 inches), and damage was estimated at one million dollars. A flood of lesser gravity took place on Dec. 31, 1942, with damage estimated to be many thousands of dollars. The most recent major flood, March 11, 1964, crested at 5.9 feet above major flood stage at New Cumberland Locks, and Dam. A projected Intermediate Regional Flood (IRF) based on previous gage records would have a peak discharge of 405,000 cubic feet per second and would reach an elevation of 680.3 m.s.l. at New Cumberland Locks and Dam Upper Gage. Maximum velocity in the main channel would be 10 ft. per sec. and in the overbank area 3 ft. per sec. Damage would be in excess of $2,000,000. A complete flood profile, indicating lands inundated by the 1936 flood areas which would be flooded by an IRF is shown on topographic maps. (LaPointe-North Carolina)
W74-09972

FLOODING PROBLEMS ASSOCIATED WITH CURRENT HIGH LEVELS OF THE GREAT LAKES.
Michigan Dept. of Natural Resources, Lansing. Water Development Services Div.
For primary bibliographic entry see Field 2H.
W74-09994

NOVEMBER 1972 FLOODS ON THE LOWER GREAT LAKES,
Windsor Univ., (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 2H.
W74-10050

A CASE STUDY IN INTERSTATE RESOURCE MANAGEMENT: THE CALIFORNIA-NEVADA WATER CONTROVERSY, 1955-1968,
California Univ., Davis. Dept. of History.
For primary bibliographic entry see Field 6E.
W74-10083

VARIATION OF REGIME COEFFICIENTS IN PAKISTAN CANALS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-10219

RELATION OF SEASONAL DISTRIBUTION OF RUNOFF TO FLUCTUATIONS IN ANNUAL DISCHARGE (OBUSLOVLENNOST' VNUTRIGODOVOGO RASPREDELENIYA STOKA KOLEBANIYAMI VODNOSTI GODA),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 2E.
W74-10222

POSSIBLE EFFECT OF CHANGES IN HYDROGEOLOGIC CONDITIONS OF THE PITSUNDA PENINSULA ON PITSUNDA PINE TREES (O VOZMOZHNOSTI VLIYANIYA IZMENENIY GIDROGEOLOGICHESKIKH USLOVIY P-OVA PITSUNDA NA PITSUNDSKUYU SOSNOVUYU ROSHCHU),
For primary bibliographic entry see Field 3C.
W74-10224

PROBLEMS OF RELIABILITY OF WATER-SUPPLY SYSTEMS (O PROBLEMAKH NADEZHNOSTI SISTEM VODOSNABZHENIYA),
Moskovski Inzhenerno-Stroitelnyi Institut (USSR).
N. N. Abramov.
Vodnyye Resursy, No 2, p 114-119, 1974.

Descriptors: *Conferences, *Water supply, *Reliability, Quality control, Standards, Design, Accidents, Damages.
Identifiers: *USSR.

The First All-Union Scientific and Technical Conference on Reliability of Water Supply Systems was held at the Moscow Construction Engineering Institute, October 24-26, 1973. The conference was attended by representatives of 110 organizations, including 31 universities, 14 scientific research institutes, 33 planning and design agencies, 18 industrial organizations, and 14 representatives of ministries and departments. A total of 22 papers were presented. Proposals introduced at the conference were concerned with further development of the theory and methods of computation and implementation of measures to insure the reliability of water-supply systems. (Josefson USGS)
W74-10225

TEMPERATURE REGIME OF DEEP WATER BODIES DURING SPRING AND SUMMER HEATING (TEMPERATURNYY REZHIM GLUBOKIKH VODOYEMOV V PERIOD VESENNE LETNEGO NAGREVA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 2H.
W74-10226

RELATION OF FLUCTUATIONS IN LEVEL OF THE CASPIAN AND ARAL SEAS (O SVYAZ KOLEBANIY UROVNEY KASPIYSKOGO I ARAL'SKOGO MOREY),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 2H.
W74-10229

WATER RESOURCES OF THE KOMI ASS AND PROSPECTS OF THEIR USE (VODNYY RESURSY KOMI ASSR I PERSPECKTIVY IK ISPOL'ZOVANIYA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
N. N. Vetoshkina, G. A. Yestaf'yev, R. G. Dzhamalov, I. S. Zektser, and G. P. Kalinin.
Vodnyye Resursy, No 2, p 3-16, 1974. 8 fig, 3 tab, 10 ref.

Descriptors: *Water resources, *Water utilizatio *Water supply, *Water balance, Inflo Discharge(Water), Precipitation(Atmospheri Evaporation, Runoff, Surface waters, Surfac

groundwater relationships, Groundwater resources, River basins, Maps, Equations.
Identifiers: USSR(Komi ASSR), Isolines.

The Komi ASSR, which covers 416,800 sq km, is predominantly a gently undulating plain with elevations ranging from 100 to 300 m. Annual precipitation over most of the territory is about 650 mm. Evaporation in the Republic increases from 300 mm in the north to 470 mm in the south. Runoff volumes of the Pechora and Vychegda Rivers are about 120 cu km/yr and 32 cu km/yr, respectively. Total surface-water resources of the Republic are 176.4 cu km, of which 13.4 cu km (8%) are derived from the Nenets National District. Outflow from the Republic into the Nenets National District is 72% of total runoff. Total drained fresh groundwater resources (area 411,000 sq km) are 35 cu km/yr, of which 24 cu km are concentrated in the Pechora Basin, 8 cu km in the Vychegda Basin, and 3 cu km in the Mezen' Basin. Groundwater yield (area 386,000 sq km) is 660 cu m/sec or 21 cu km/yr. Water availability per sq km of area is about 430,000 cu m/yr or approximately twice that for the USSR on the whole. Per capita availability of water in the Republic is 185,000 cu m/yr, while that for the USSR is only about 20,000 cu m/yr. Total volume of water consumed by all branches of the national economy in the Republic in 1970 was 1,620,000 cu m/day or 0.59 cu km/yr, of which about 91% was for industrial use and 9% for public and domestic use. Qualitative and quantitative estimates of water use were examined without regard for the possible diversion of part of the runoff of Komi rivers (about 37 cu km/yr) into the Volga Basin. (Josefson-USGS)
W74-10230

GUIDELINES FOR THE DESIGN OF SUBSURFACE DRAINAGE SYSTEMS FOR HIGHWAY STRUCTURAL SECTIONS,
Cedergren/KOA, Sacramento, Calif.
For primary bibliographic entry see Field 4C.
W74-10235

SOME PATTERNS OF VARIATIONS IN AVERAGE MONTHLY RIVER AND GROUNDWATER LEVELS IN THE PRIPYAT' POLES'YE REGION (NEKOTORYYE ZAKONOMERNOSTI IZMENENIYA SREDNEMESYACHNYKH UROVNEY REK I PODZEMNYKH VOD NA TERRITORII PRIPYATSKOGO POLES'YA),
G. I. Sachok, and M. V. Fadeyeva.
Akademiya Nauk BSSR Doklady, Vol 17, No 2, p 175-178, February 1973. 1 fig, 3 tab, 1 ref.

Descriptors: *Water levels, Rivers, *Groundwater, Average, *Monthly, Annual, Seasonal, Variability, Statistical methods, Correlation analysis, Probability, *Forecasting, Gaging stations, Succession.
Identifiers: *USSR(Belorussia), *Pripyat' River(USSR), *Poles'ye Region(USSR).

The general character of variability of river and groundwater levels in different parts in the Poles'ye Region in southeastern Belorussia is very similar and represents a quite clear, regular succession of stages complicated by characteristics of a specific year and of specific hydrogeological conditions. A new method is used for graphic representation of long-term series of average monthly levels in the form of probability fields. On the basis of application of this and other statistical methods, attention is focused on the possibility of improving forecasts of average monthly river and groundwater levels. (Josefson-USGS)
W74-10263

WATER RESOURCES DATA FOR TEXAS, 1973: PART 1. SURFACE-WATER RECORDS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-10268

A METHODOLOGY FOR PLANNING LAND USE AND ENGINEERING ALTERNATIVES FOR FLOODPLAIN MANAGEMENT,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
R. N. Weisz.
Available from Univ. Microfilms, 300 No Zeeb Rd, Ann Arbor, Mich, 48106 (Order No 74-2013). PhD Dissertation, 1973. 286 p.

Descriptors: *Mathematical models, *Land use, *Flood plains, Land management, Floodproofing, Costs, Channels, Dams, Engineering structures, Distribution, *Methodology, *Decision making, Flood protection, Planning, Management, *Alternative planning.
Identifiers: *Floodplain management, Land distribution.

Analytical and decision-making methodology is developed in terms of planning land use and regulations, development policies, and engineering measures. The objective of the floodplain management system is to select the most economically efficient combination of land use and engineering alternatives. A test application and computer study makes decision rules for combining: spatial and temporal distribution of urban land uses; site elevation through dirt fill; floodproofing; public acquisition of undeveloped land for open space uses; public acquisition and removal of existing improvements from the floodplain; dams; and channel improvement. The methodology can be used to formulate floodplain management system plans, to evaluate the economic impact of floodplain management system plans, to perform 'with and without' analyses, and to perform incremental analyses of development policy and engineering alternatives. (Prague-FIRL)
W74-10277

PROGRESS IN THE RURAL WATER PROGRAMS OF LATIN AMERICA (LOS PROGRAMAS DE ABASTECIMIENTO RURAL DE AQUA DE AMERICA LATINA),
For primary bibliographic entry see Field 6E.
W74-10279

A MATHEMATICAL MODEL FOR THE ANALYSIS OF RIVER DIVERSIONS,
Hydraulics Reasearch Station, Wallingford(England).
For primary bibliographic entry see Field 8B.
W74-10320

WATER-DISTRIBUTION RESEARCH AND APPLIED DEVELOPMENT NEEDS.
American Water Works Association, New York. Research Committee on Distribution Systems.
Journal of the American Water Works Association Vol 66, No 6, p 385-390, June 1974. 45 ref.

Descriptors: *Water distribution(Applied), *Research, *Water resources development, Planning, Design, Operation and maintenance, Simulation analysis, Potable water, Operating costs, Networks, Systems analysis.
Identifiers: Cost-effectiveness.

Reported is the work of a special AWWA committee, charged with evaluation of research and applied development needs in the technical planning, design, and operation of water distribution systems. A water distribution system is defined as including all water utility components for distribution of finished or potable water by means of gravity storage feed or pumps through distribution piping networks to customers or other users, including distribution-equalizing storage. Attention centers on subject matter containing significant potential transferability of findings to most water utilities. Basic planning procedures are outlined and priorities are identified. System simulation is discussed, and the basic objectives in automatic operational control are defined as maximization of service and minimization of operating costs. Discussed is the computational objective of network analysis--to define the piezometric surface of the network; a near solution can be determined using iterative, successive approximation techniques. Discussed also are the: status of developments; demand characteristics; analysis requirements; and additional needs and amplifications. Needed are an expectation of high cost-effectiveness and a good potential for wide transferability of results. (Bell-Cornell)
W74-10323

4B. Groundwater Management

THE TRANSMISSIVITY ITERATIVE PROGRAMS ON THE PDP-9 COMPUTER - A MAN-MACHINE INTERACTIVE SYSTEM,
Battelle-Pacific Northwest Labs., Richland, Wash. Mathematics Dept.
For primary bibliographic entry see Field 2F.
W74-09825

PRELIMINARY EVALUATION OF METHODS FOR THE DISPOSAL OF TRITIATED WATER FROM NUCLEARLY STIMULATED NATURAL GAS WELLS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5C.
W74-09837

SAVANNAH RIVER LABORATORY PROGRESS REPORT-LONG-RANGE WASTE MANAGEMENT.
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
For primary bibliographic entry see Field 5E.
W74-09881

MODELING FLOW AND CHEMICAL QUALITY CHANGES IN AN IRRIGATED STREAM-AQUIFER SYSTEM,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 5B.
W74-09883

MATHEMATICAL SIMULATION OF THE SUBSIDENCE OF VENICE 2. RESULTS,
Centro di Ricerca IBM di Venezia (Italy).
For primary bibliographic entry see Field 2F.
W74-09884

SURVEY OF REMOTE SENSING APPLICATIONS,
Geological Survey, Reston, Va. Eros Program Office.
For primary bibliographic entry see Field 7B.
W74-09899

SENSITIVITY ANALYSIS OF INPUT PARAMETERS IN NUMERICAL MODELING OF STEADY STATE REGIONAL GROUNDWATER FLOW,
Geulph Univ., (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 2F.
W74-09900

GROUND WATER POLLUTION FROM SUBSURFACE EXCAVATIONS: PART IV. MORE ON POLLUTION FROM WELLS.
For primary bibliographic entry see Field 5B.
W74-09929

GROUNDWATER OF SIBERIA AND SOVIET FAR EAST (PODZEMNYYE VODY SIBIRI I DAL'NEGO VOSTOKA),
For primary bibliographic entry see Field 2F.
W74-09936

HYDROLOGIC DATA OF THE NEPONSET AND WEYMOUTH RIVER BASINS, MASSACHUSETTS,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 4A.
W74-09945

LONG ISLAND WATER,
For primary bibliographic entry see Field 2F.
W74-09961

METHOD FOR CONTROLLING FLOW OF AQUEOUS FLUIDS IN SUBTERRANEAN FORMATIONS,
Dow Chemical Co., Midland, Mich.
For primary bibliographic entry see Field 8G.
W74-10029

A THEORETICAL STUDY OF GEOTHERMAL ENERGY EXTRACTION,
Los Alamos Scientific Lab., N. Mex.
F. H. Harlow, and W. E. Pracht.
Journal of Geophysical Research, Vol 77, No 35, p 7038-7048, December, 1972. 3 fig, 2 tab, 7 ref.

Descriptors: *Geothermal studies, Thermal water, *Theoretical analysis, Energy.
Identifiers: *Geothermal energy extraction, *Thermal power, Geothermal well life.

The principal conclusions from this study are that under sufficiently favorable circumstances large amounts of geothermal energy can be extracted from dry wells in hot rock. This conclusion does not depend strongly on the nature of the initial hydraulic fracture, but it does depend on the validity of the thermal fracture hypothesis and on the assumption that underground leakage does not preclude the maintenance of pressure. These features will require field testing. (Staplin-NWWA)
W74-10087

WATER IS WHERE YOU FIND IT,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 8B.
W74-10094

TEST WELL YIELDS DATA ON HYDROGEOLOGIC PROPERTIES OF SUBSURFACE MATERIALS,
Geological Survey, Washington, D.C. Water Resources Div.
H. E. Pearson.
The Johnson Drillers Journal, p 1-3, September-October, 1973. 3 fig, 2 tab.

Descriptors: *Test wells, *Observations wells, Borehole geophysics, Water quality, Water levels, Pump testing, Water yield, *Basalts, *Washington.
Identifiers: *Paterson(Wash), *Hydrogeologic properties, Exploration tests.

A special test-observation well was drilled near Paterson, Washington to gather hydrologic data needed to understand groundwater occurrences in basalt sequences. These data were obtained from sample analysis and a suite of geophysical logs that included a caliper log, a fluid resist log, a temperature log, and a gamma-ray log. Two pump tests were performed to determine the potential yield of the producing intervals encountered in the well. The potential yield, water level, degree of hydraulic communication, and chemical quality of the groundwater are described for each of the horizons. (Staplin-NWWA)
W74-10095

DETERMINING FRACTURE PRESSURE GRADIENTS FROM WELL LOGS,
Schlumberger Well Services, Houston, Tex.
For primary bibliographic entry see Field 8B.
W74-10099

RESISTIVITY METHODS IN PROSPECTING FOR GROUND WATER,
Kansas State Univ., Manhattan. Dept. of Geology.
D. W. Steeples.
Master's Thesis, 1970. 47 p, 7 fig, 4 tab, 27 ref, 1 append.

Descriptors: *Exploration, *Resistivity, Alluvial aquifers, Geophysics, Subsurface investigations, *Kansas, Groundwater.
Identifiers: *Groundwater exploration.

A technique for groundwater exploration in alluvial sediments near Manhattan, Kansas was developed utilizing direct current earth resistivity. The resistivity survey was performed with portable current equipment in a four-square-mile area just east of Manhattan, Kansas. The Wenner configuration became the basis for the field work. Interpretation methods included curve inspection, Moore cumulative resistivity method, Roman's curve-matching method, and relative resistivity mapping using Keck's curves to adjust the values obtained in the field. These make it possible to map relative resistivity for specified electrode spacing intervals. The relative resistivity maps were compared with an analog computer model of transmissivity in the same four-square-mile area. The comparison showed similar trends for high resistivity and high transmissivity values. It was inferred that high resistivity and high transmissivity have a substantial degree of correlation. Wider electrode spacing intervals showed probable trends for the direction of erosional channels in bedrock in a river valley. The method developed can be recommended for use in areas where alluvium covers bedrock. The method should not be used by itself without test drilling or some other independent method of exploration. (Staplin-NWWA)
W74-10100

POTENTIAL USES FOR BOREHOLE LOGS IN MINERAL EXPLORATION,
Sproule (J. C.) and Associates Ltd., Calgary (Alberta).
For primary bibliographic entry see Field 8G.
W74-10105

THE STATES ENTER THE RURAL WATER PICTURE,
Conset, Inc., Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10106

ARTIFICIAL REPLENISHMENT OF GROUNDWATER STORAGE (OBISKUSSTVENNOM VOSPOLNENII ZAPASOV PODZEMNYKH VOD),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenerno Geologii, Moscow (USSR).
M. A. Khordikaynen.
Vodnyye Resursy, No 2, p 170-179, 1974. 1 fig, 26 ref.

Descriptors: *Groundwater, *Groundwater recharge, *Artificial recharge, Induced infiltration, Aquifers, Water supply, Zoning.
Identifiers: *USSR(Kazakhstan).

Principles of application and development of artificial replenishment of groundwater storage are discussed. Methods of artificial replenishment are described, and its application in the USSR and foreign countries is reviewed. Principles and methods of small-scale zoning of the USSR based on artificial groundwater replenishment conditions are presented. A part of Central Kazakhstan was used to illustrate this zoning. (Josefson-USGS)
W74-10223

WATER RESOURCES OF THE KOMI ASSR AND PROSPECTS OF THEIR USE (VODNYYE RESURSY KOMI ASSR I PERSPECKTIVY IKH ISPOL'ZOVANIYA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 4A.
W74-10230

RECONNAISSANCE OF WATER QUALITY IN THE VICINITY OF SUNNILAND OIL FIELD, COLLIER COUNTY, FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W74-10240

ISOTOPIC AND CHEMICAL CHARACTERISTICS OF HIGH-LEVEL GROUNDWATER ON OAHU, HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
T. H. Hufen, R. W. Buddemeier, and L. S. Lau.
Water Resources Research, Vol 10, No 2, p 366-370, April, 1974. 4 fig, 2 tab, 18 ref. OWRR B-019-H1(1).

Descriptors: *Groundwater, *Geohydrology, *Radiocarbon, Tritium, Tunnels, Soil, Isotopes, Chemistry, *Hawaii, *Chemical properties.
Identifiers: *Isotopic composition, Oahu(Hawaii), Dike waters.

High level dike-confined groundwaters and high-level perched groundwaters on Oahu, Hawaii, were analyzed for tritium, radiocarbon, carbon 13, and several chemical constituents. Discharges from several tunnels that tap dike compartments contain postbomb tritium, indicating the presence of modern (since 1954) recharge. The amount of this recharge in samples taken inside one of the tunnels is a function of the distance between overlying surface and sampling point. Chemical and carbon isotopic compositions of dike waters, established in the soil zone of their overlying ground surface, remain unchanged while the water is passing through the basaltic carbonate-free compartments. Dike water carbon isotope data are sufficiently consistent to serve as initial values for the dating of water in the Honolulu basal aquifers. The radiocarbon data suggest that the maximum value for residence of the dike waters is of the order of 100 years. (Prague-FIRL)
W74-10273

EFFECTS OF LANDFILL DISPOSAL OF CHEMICAL WASTES ON GROUNDWATER QUALITY,
Minnesota Univ., Minneapolis. School of Public Health.
For primary bibliographic entry see Field 5B.
W74-10278

OPTIMAL PUMPING FOR AQUIFER DEWATERING,
Stanford Univ., Calif. Dept. of Geology.
E. Aguado, I. Remson, M. F. Pikul, and W. A. Thomas.
Journal of the Hydraulics Division, American Society of Civil Engineers Vol 100, No HY7, Paper 10639, p 869-877, July 1974. 5 fig, 1 tab, 3 ref.

Descriptors: *Aquifers, *Dewatering, *Drainage, *Groundwater, Hydraulics, *Linear programming, Management, Optimization, Constraints, Equations, Wells, Pumping, Methodology, Mathematical models, Systems analysis.
Identifiers: *Finite differences.

A method, using finite difference approximations of the groundwater differential equation as constrints in a linear programming model, is presented for determining the optimal well locations and steady-state pumping scheme for dewatering a construction site. Use of the method to determine optimal well distributions and steady-state pump-

ing patterns for dewatering a dry dock excavation site is described. Because the currently available linear programming method is restricted to steady-state solutions, auxiliary use was made of the preceding transient numerical model to predict dewatering times. Further development of the transient versions of the linear programming model is in progress. Solutions of alternate optimization problems may be readily achieved; for example, it might be desirable to restrict the number of wells or their locations, and it might be desirable to consider economic factors. Such solutions may be achieved with modifications of constraints or objective functions. The linear programming methodology is shown to have provided a scheme for the efficient allocation of wells and pumping to achieve a desired distribution of hydraulic heads. (Bell-Cornell)
W74-10325

4C. Effects On Water Of Man'S Non-Water Activities

A PRELIMINARY REPORT ON URBAN HYDROLOGY AND URBAN WATER RESOURCES: OAHU, HAWAII,
Hawaii Unin., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 2A.
W74-09803

SEASONAL EFFECTS IN FLOOD SYNTHESIS,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
E. F. Brater, S. Sangal, and J. D. Sherrill.
Water Resources Research, Vol 10, No 3, p 441-445, June 1974. 6 fig, 3 tab, 8 ref.

Descriptors: *Urbanization, *Flood forecasting, *Snowmelt, *Model studies, Hydraulic models, Hydrograph analysis, Synthetic hydrology, Michigan, Flood frequency, Rainfall-runoff relationships, Seasonal, Urban hydrology, Urban runoff, Duration curves, Rainfall intensity.

The effect of urbanization on flood flows was investigated by analyzing inputs and corresponding flood hydrographs from many watersheds along with corresponding inputs and responses from watershed models. The inputs consisted of precipitation plus snowmelt minus infiltration and retention. Because of the large seasonal variation in infiltration rates, accuracy was inproved by treating rainfall frequencies seasonally in predicting flood runoff from precipitation and snowmelt. As procedures were developed and improved in accuracy, it became necessary to examine the effect of snowmelt on winter frequencies and the seasonal variation in time and intensity of rainfall patterns more closely. A procedure was developed for including snowmelt with winter rains, and the resulting frequency curves of rain plus snowmelt are presented and compared with conventional rainfall frequency curves. A method of deriving time-intensity patterns from daily rainfall was developed. A large difference exists between typical winter and summer patterns in southeastern Michigan. (Knapp-USGS)
W74-09910

PROBLEMS IN MODELING URBAN WATERSHEDS,
American Society of Civil Engineers, Marblehead, Mass. Urban Water Resources Research Program.
M. B. McPherson, and W. J. Schneider.
Water Resources Research, Vol 10, No 3, p 434-440, June 1974. 3 fig, 45 ref.

Descriptors: *Urban hydrology, *Urban runoff, *Model studies, *Simulation analysis, Rainfall-runoff relationships, Water quality, Storm runoff, Reviews, Runoff forecasting, Mathematical models, Water management(Applied), Urban drainage, Storm drains.

Modeling of urban watersheds is complicated by the complexities of the hydrologic system brought about by urbanization, model scale, and client diffusion. Modeling objectives vary widely, from storm sewer design to management of local runoff to river basin planning. Each objective requires a different approach to modeling. Current difficulties in modeling involve inherent nonlinearities in most methods of processing input for linear models, problems of storm definition, interconnection of urban catchment areas, and shortage of detailed rainfall-runoff water quality data for calibration. Despite handicaps, progress has been made in modeling urban watersheds and will continue to be made. (Knapp-USGS)
W74-09911

A PROPOSED OPEN BEACHES STATUTE FOR FLORIDA,
Miami Univ., Fla. Ocean Law Program.
For primary bibliographic entry see Field 2J.
W74-09977

GUIDELINES FOR THE DESIGN OF SUBSURFACE DRAINAGE SYSTEMS FOR HIGHWAY STRUCTURAL SECTIONS,
Cedergren/KOA, Sacramento, Calif.
H. R. Cedergren, K. H. O'Brien, and J. A. Arman.
Available from NTIS, Springfield, Va 22151 as PB-220 116; Price $3.00 printed copy; $1.45 microfiche. Joint Venture Report to Dept of Transportation, Federal Highway Administration, June 1972. 24 p, 13 fig. Dept. of Trans. Contract FH-11-7582.

Descriptors: *Subsurface drains, *Paving, *Highways, *Drainage systems, Runoff, *Design, Infiltration, Construction joints, Subsurface drainage.

Design for pavement subsurface drainage systems includes open-graded drainage layers, collector drains, pipe outlets and markers. Design examples are given for embankment sections, cut sections and superelevated curves. Emphasis is on draining water that infiltrates the pavement structure from the surface through cracks, construction joints, and through permeable surfaces, medians and shoulders. General guidance is given for design, construction, and operation of subsurface drainage systems. (Knapp-USGS)
W74-10235

4D. Watershed Protection

DRAINAGE AND EROSION CONTROL FACILITIES, FIELD PERFORMANCE INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8A.
W74-09948

MEASUREMENT AND MANAGEMENT ASPECTS OF WATER TOXICOLOGY: THE MALIBU WATERSHED A MIXED RESIDENTIAL AND WILDNESS AREA,
California Univ., Los Angeles. School of Public Health.
For primary bibliographic entry see Field 5B.
W74-09950

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

DISTRIBUTION OF TRACE METALS IN A WARM WATER RELEASE IMPOUNDMENT,
Quachita Baptist Univ., Arkadelphia, Ark.
For primary bibliographic entry see Field 2H.
W74-09801

DETERMINATION OF NITRITE AND NITRATE IONS IN NATURAL WATERS USING AROMATIC ORTHO DIAMINES AS REAGENTS,
Wisconsin Univ., Green Bay. Ecosystems Analysis.
P. J. Canney, D. E. Armstrong, and J. H. Wiersma.
Available from the National Technical Information Service as PB-233 786 $3.25 in paper copy, $1.45 in microfiche. Wisconsin Water Resources Center, Madison Technical Report, WRC-WIS 74-04, June 1974. 30 p, 6 fig, 5 tab, 26 ref. OWRR A-051-WIS(2), 14-31-0001,3850, 14-31-0001-4050.

Descriptors: *Nitrogen, *Nitrates, *Nitrites, *Analytical techniques, Water quality, Organic compounds, Ions, *Pollutant identification, Ion exchange, Spectrophotometry, Aromatic compounds.
Identifiers: Reagents.

Nine reagents were evaluated for suitability as reagents for the determination of nitrite nitrogen. The reagents were 1,8-diaminonaphthalene and 8 aromatic orthodiamines. The aromatic orthodiamines react to form triazoles determinable by fluorometric or spectrophotometric methods. Of the reagents evaluated, 2,3-diaminofluorene (2,3-DAF) and 5-(3,4-diaminophenyl)-2,1,3-benzoselenadiazole (DABSe) were selected for analytical use. Several reagents reacted with Nitrite, but were eliminated because of poor sensitivity or lack of conformity to Beer's Law. The DABSe method involved extraction of the product with 1,2-dichloroethane (DCE), while the DCE extraction and aqueous procedures were developed for 2,3-DAF. Detection limits for nitrite N were 1,5, and 1 microgram per liter for the DABSe, aqueous 2,3-DAF, and DCE-2,3-DAF methods. Interferences from high concentrations of manganese dioxide and Fe (III) were eliminated by filtration and ion exchange treatments. Attempts to develop a nitrate procedure involving reduction of nitrate to nitrite in the presence of DABSe or 2,3-DAF were unsuccessful. However, both methods were compatible with nitrate determination based on reduction of nitrate to nitrite with a Cd-Hg column. For nitrite and nitrate determination the DABSe and 2,3-DAF methods performed as well as the sulfanilic acid and 1-napththylamine method.
W74-09809

MODELS AND COMPUTER CODES FOR EVALUATING ENVIRONMENTAL RADIATION DOSES,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5B.
W74-09824

ANNUAL PROGRESS REPORT FOR THE PERIOD JULY 1971-JUNE 1972-NEW BRUNSWICK LABORATORY.
New Brunswick Lab. (AEC), N.J.
Aval: NTIS, Springfield, Va., as Rept. No. NBL-265, $5.45/copy, $1.45/microfiche. Report No. NBL-265, October 1972. 111 p, 14 fig, 41 tab, 101 ref.

Descriptors: *Research and development, *Laboratories, *Analytical techniques, Research facilities, Technology, Elements(Chemical), Radioisotopes, Abstracts, Documentation, *Bibliographies, *Reviews.

An AEC Research and Development annual report of the activities at the New Brunswick Laboratory includes abstracts of approximately 25 reports of progress on various analytical techniques. Some of the more important elements of concern are uranium, thorium, sodium, carbon, iron, chromium, manganese, boron, and plutonium. (Houser-ORNL)
W74-09830

TRACE ELEMENT MEASUREMENTS AT THE COAL-FIRED ALLEN STEAM PLANT - PROGRESS REPORT, JUNE 1971 TO JANUARY 1973,
Oak Ridge National Lab., Tenn.
N. E. Bolton, R. I. Van Hook, W. Fulkerson, W. S. Lyon, and A. W. Andren.
Aval: NTIS, Springfield, Va., as Rept. No. ORNL-NSF-EP-43; $5.45/copy, $1.45/microfiche. Report No. ORNL-NSF-EP-43, March 1973. 89 p, 24 fig, 12 tab, 27 ref, 5 append.

Descriptors: *Trace elements, Geochemistry, *Steam turbines, *Electric plants, Fuels, *Coals, Effluents, *Monitoring, Surveys, Sampling, Analytical techniques, Water pollution, Water pollution sources, Fallout, Soil contamination, Ecology, Meteorology, Lakes, Streams, Mississippi River, Sediment, Environmental effects, *Tennessee.
Identifiers: *McKellar Lake(Tenn), *Horn Lake(Tenn).

Oak Ridge National Laboratory is investigating rthe disposition of trace elements from coal combustion at the Tennessee Valley Authority (TVA) Thomas A. Allen Steam Plant in Memphis, Tennessee. The study consists of two parts: (a) in-plant sampling to obtain a mass balance for an extensive suite of elements and (b) sampling in the environment around the plant to ascertain the fate of the discharges of these elements. To date, with the assistance of TVA, one set of in-plant sampling runs for one of the three independent cyclone boilers at the plant has been obtained. Measurements by neutron activation analysis, spark source mass spectroscopy (with isotope dilution for some elements), and atomic absorption spectroscopy yielded an approximate balance for many elements. Measurements of the elemental composition of the other specimens collected have not yet been completed. (Houser-ORNL)
W74-09833

LABORTORY TESTING AND FIELD TEST SUPPORT OF THE SO-2 STACK GAS MONITOR,
Industrial Nucleonics Corp., Columbus, Ohio. New Ventures Div.
R. J. Pfeifer.
Aval: NTIS, Springfield, Va., as Rept. No. COO-3218-2; $4/copy, $1.45/microfiche. Final Report No. COO-3218-2, December 31, 1973. 32 p, 3 fig, 1 tab.

Descriptors: *Monitoring, *Sulfur compounds, Fuels, Coals, Oxides, *Gases, Instrumentation, Gages, Effluents, *Measurement, *Testing, *Air pollution.

The program to develop a stack gas monitor which utilizes appropriate nucleonic techniques has been a technical success. The gauge so developed possesses certain marked advantages over competitive sulfur dioxide monitors. In particular, the Mercury Substitution and Nucleonic Detection (MSND) working model requires a simple sampling system and is virtually insensitive to interfering substances typically found in stack gas emissions. Additional laboratory tests have been conducted in lieu of the field test program. The guage is currently available for field testing if a site can be identified and if the requirement for such testing is ascertained. (Houser-ORNL)
W74-09834

NSF-RANN TRACE CONTAMINANTS ABSTRACTS.
Oak Ridge National Lab., Tenn. Toxic Materials Information Center.
Report No. ORNL-EIS-73-60, Vol 1, No 1, June 1973. 41 p, 51 ref, 3 indexes.

Descriptors: *Trace elements, *Toxicity, *Air pollution, *Water pollution, *Water pollution sources, *Soil contamination, Fallout, Effluents, Absorption, Ecology, Ecosystems, Hydrology, Environment, Environmental effects, Geochemistry, Water chemistry, Public health, Information exchange, Publications, Documentation, Abstracts.
Identifiers: *Environmental impact.

The Toxic Materials Information Center, Environmental Information System Office, assumes additional responsibility for service to the NSF-RANN Trace Contaminants Program with this initial issue of Trace Contaminants Abstracts; a program oriented to serve as a communications link, making dissemination of research results to a large audience a simple, easy procedure for all investigators. The TMIC is a project support center for the Ecology and Analysis of Trace Contaminants Program at ORNL; its purpose is to acquire, store, retrieve, and disseminate data on toxic materials in the environment, with particular emphasis on metals and organometallic compounds. While its major purpose is to serve the ORNL researchers in this program, other Trace Contaminants Program investigators, other governmental agencies, and the public in general may query the center's file--to the degree that present funding and staffing allow. Present TMIC computerized holdings number approximately 10,000 abstracted citations, while approximately 25,000 other items are available for manual search. The TMIC is a component of a larger broad-coverage Environmental Information System Office at Oak Ridge National Laboratory, serving several government agencies in addition to NSF and AEC. Other areas of concern include energy, land use, toxicology, mutagenecity, and all forms of environmental impact. (Houser-ORNL)
W74-09835

PRELIMINARY EVALUATION OF METHODS FOR THE DISPOSAL OF TRITIATED WATER FROM NUCLEARLY STIMULATED NATURAL GAS WELLS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5C.
W74-09837

ENVIRONMENTAL MONITORING AT MAJOR U.S. ATOMIC ENERGY COMMISSION CONTRACTOR SITES, CALENDAR YEAR 1972.
Division of Operational Safety (AEC), Washington, D.C.
Aval: NTIS, Springfield, Va., as Rept. No. WASH-1259; $16.25/copy, $1.45/microfiche. Report WASH-1259, August 1973. 1223 p, 154 fig, 357 tab, 176 ref, 28 append, 9 attach.

Descriptors: *Monitoring, *Environment, Environmental effects, Environmental control, Nuclear energy, Effluents, Atmosphere, *Radioactivity, Air pollution, Water pollution, Water pollution sources, Soil contamination, Fallout, Meteorology, Hydrology, Waste disposal, Public health, Soils, Sediments, Ecology, Ecosystems, Silts, Food chains, Laboratories, Nuclear powerplants, Research and development.
Identifiers: *Atomic Energy Commission.

The purpose of this compendium is to provide a compilation of the annual reports summarizing the results of the environmental monitoring programs conducted at each of the Atomic Energy Commission sites which have a potential for environmental impact or which release a significant quantity of radioactivity or nonradioactive wastes. The individual reports comprising this compendium were prepared in accordance with AEC requirements for environmental monitoring and reporting. Each contains data on the levels of radioactivity and nonradioactive pollutants in the environs of each site, and an interpretation of the sampling results in relation to the appropriate standards for environmental protection. This compendium has been compiled, and is being published for the first time this year, as a central reference document describing the results of the environmental programs conducted at all of the AEC sites. (See W74-09841 thru W74-09859) (Houser-ORNL)
W74-09840

ENVIRONMENTAL MONITORING AND POLLUTANT INVENTORY PROGRAM REPORT FOR PANTEX PLANT (AMARILLO, TEXAS), COVERING CALENDAR YEAR 1972.
Mason and Hanger - Silas Mason Co., Inc., Amarillo, Tex.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 129-176, 8 tab, 11 ref, 1 append, 7 attachments.

Descriptors: *Nuclear energy, *Effluents, *Nuclear explosions, *Fallout, *Plutonium, *Uranium, Water pollution, Air pollution, Soil contamination, Analytical techniques, Sampling, Safety, Assessment, Public health, *Texas.

Data are provided on the pollutant inventory program and the radiological and nonradiological environment surrounding the Pantex Plant at Amarillo, Texas. Major concern is given to the environmental condition after firing test shots which release uranium into the atmosphere. The deposition of radioactive materials from the dust clouds formed is traced to the soil, vegetation, and surface water. Routine analyses of offsite samples are made to determine the impact of the plant operations upon the surrounding environment. Data on concentration of uranium and plutonium in soil, vegetation, and water are given. (See also W74-09840) (Howser-ORNL)
W74-09841

ENVIRONMENTAL MONITORING REPORT, 1972, PINELLAS PLANT, ST. PETERSBURG, FLORIDA.
General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission, Contractor Sites, Calendar Year 1972, Report WASH-1259, p 177-196, August 1973. 3 fig, 4 tab.

Descriptors: *Monitoring, *Environment, *Nuclear energy, *Effluents, *Tritium, *Krypton, Sampling, Analytical techniques, Assay, Regulation, Water pollution, Water pollution sources, Public health, *Florida.

The Pinellas Plant is located on a 100-acre site in the center of Pinellas County, Florida. The primary radionuclide used at the plant is tritium. The hazardous aspects of tritium are pointed out and detail is given for monitoring the plant effluents for tritium and krypton. Off-site surface water samples are collected, analyzed, and reported. On-site sampling includes the sewage treatment facilities, industrial wastewaters, and stack effluents. Data reported indicate the concentration of the radionuclides around the plant area to be well below the maximum permissible limits. (See also W74-09840) (Houser-ORNL)
W74-09842

ANNUAL ENVIRONMENTAL MONITORING REPORT - ROCKY FLATS PLANT, (COLORADO), JANUARY THROUGH DECEMBER, 1972,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
M. R. Boss, F. D. Hobbs, R. W. Loser, and D. E. Michels.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 197-230, August 1973. 6 fig, 16 tab, 9 ref.

Descriptors: *Monitoring, *Environment, *Surveys, *Effluents, *Radioactivity, *Air pollution, *Water pollution, *Soil contamination, Ecology, Streams, Reservoirs, Measurement, Assay, Plutonium, Computer program, Model studies, Standards, Regulation, Public health, *Colorado.
Identifiers: *Great Western Reservoir, *Walnut Creek, *Woman Creek, *Standley Lake, *Mower Reservoir.

Results of the environmental monitoring program in the vicinity of the Rocky Flats Plant during 1972 indicate that yearly average environmental concentration of plutonium in air and water was less than 2% of applicable Federal Standards. Total long-lived alpha emitter concentration in air, including natural background, was less than 30% of the soluble plutonium-239 standard. No apparent changes were noted in the distribution of plutonium in soil from previous years. Changes in the distribution isopleths compared with 1971 are a result of additional sample results in the computer modeling program and do not reflect physical movement of plutonium in soils. (See also W74-09840) (Houser-ORNL)
W74-09843

ENVIRONMENTAL REPORT FOR CALENDAR YEAR 1972 ON RADIOLOGICAL AND NON-RADIOLOGICAL PARAMETERS, (BATTELLE COLUMBUS LABORATORIES, OHIO).
Battelle Columbus Lab., Ohio. Health Physics Services.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 401-412, August 1973. 4 fig, 2 tab, 3 ref.

Descriptors: *Monitoring, *Radioactivity, *Environment, *Effluents, *Assay, Measurement, Uranium, Plutonium, Research and development, Laboratories, Water pollution, Water pollution sources, Standards, Regulation, Public health, Analytical techniques, Safety, Evaluation, *Ohio.

The radiological operations at the West Jefferson Nuclear Center during 1972 were basically without incident in respect to the environs. The King Avenue, Building 3 Site has experienced a substantial decrease in contract uranium activities and no incidents were recorded that resulted in excessive air or water effluent releases to the environs. One instance of inadvertent dumping of mop water at the JN-1 Hot Cell into the sanitary system occurred. This was detected and remedied without serious consequences. Sampling at the release point of the filter bed showed that concentrations were less than the Concentration Guides for release to uncontrolled areas as per AECM 0524(1). (See also W74-09840) (Houser-ORNL)
W74-09844

1972 ENVIRONMENTAL MONITORING REPORT - BROOKHAVEN NATIONAL LABORATORY, (NEW YORK).
Brookhaven National Lab., Upton, N.Y.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 413-466, August 1973. 6 fig, 19 tab, 8 ref.

Descriptors: *Monitoring, *Environment, *Laboratories, *Radioactivity, *Measurement, Assay, Safety, Evaluation, Effluents, Deposition(Sediments), Ion transport, Path of pollutants, Groundwater, Streams, Rivers, Potable water, Standards, Regulation, Ecology, Public health, Environmental effects, *New York.
Identifiers: Peconic River, Concentration.

Natural background and radiation levels in the vicinity of Brookhaven National Laboratory attributable to its operations during 1972 are summarized. Among the data reported are external radiation levels; air particulate, tritium and radioiodine concentrations; precipitation and liquid effluent-related concentrations in stream, ground water and surveillance wells, as well as in milk, grass and soil samples. About 83% of the volume of liquid effluent released onto the sand filter beds at the BNL sewage treatment plant was recovered and flowed into the headwaters of the Peconic River, while about 17% of it flowed into the ground water underlying the beds. The gross concentration of beta and gamma-emitters in it was 1.9% of the applicable radiation standard. Tritium, which is measured separately, was 0.13% of its standard. The water released into the Peconic from the Liquid Effluent Treatment Facility was well within the standards for drinking water quality established by the New York State Department of Health. (See also W74-09840) (Houser-ORNL)
W74-09845

ENVIRONMENTAL MONITORING REPORT OF THE LACROSSE BOILING WATER REACTOR (WISCONSIN) FROM JANUARY 1, 1971 TO DECEMBER 31, 1972.
Dairyland Power, Cooperative, LaCrosse, Wis.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 529-552, August 1973. 4 fig, 10 tab, 1 append.

Descriptors: *Monitoring, *Environment, *Nuclear powerplants, *Effluents, Sampling, Air, Rivers, Sediments, Milk, Fish, Vegetation, Radiation, Measurement, Assay, Safety, Evaluation, *Wisconsin.

The monitoring program at the LaCrosse Wisconsin plant includes monitoring of liquid and gaseous releases from the plant as well as environmental samples of surface air, river water, sediment, milk, fish, vegetation, and penetrating radiation. The dose at the site boundary of the LACBWR facility was determined by Thermoluminescent Dosimetry (TLD's) to be approximately 20-30 mrem/yr. The TLD's data were found to correspond closely with the plume from the plant. The off-site exposures received from the facility were well within the exposure guidelines to the general population. The activities found in the environmental samples, (i.e., milk, water, fish, etc.,) collected in 1972 in the vicinity of the LACBWR facility were within the range of the natural background. (See also W74-09840) (Houser-ORNL)
W74-09846

ENVIRONMENTAL MONITORING REPORT FOR CALENDAR YEAR 1972 FOR THE NATIONAL ACCELERATOR LABORATORY, BATAVIA, ILLINOIS,
National Accelerator Lab., Batavia, Ill.
S. I. Baker.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 553-596, August 1973. 4 fig, 5 tab, 18 ref.

Descriptors: *Monitoring, *Effluents, *Radioactivity, *Nuclear energy, Laboratories, Research and development, Air pollution, Water pollution, Streams, Water wells, Groundwater, Sampling, Analytical procedures, Measurement, *Illinois.
Identifiers: *Accelerators.

Environmental radiation data are collected from a multitude of radiation detectors throughout the accelerator and experimental areas. The three types of accelerators which produced radiation meriting monitoring for environmental purposes are discussed. The three types are: (1) penetrating radiation; (2) air-borne radioactivity; (3) water-borne radioactivity. Monthly water samples are taken from two ground water systems which represent the surface and near-surface waters and the Silurian Aquifer which is a prime water supply for many private residences in the area. Detail is given for water sample collection and the analytical procedures used for measuring the radioactivity. No measurable concentrations of accelerator-produced radionuclides were found in the surface or ground waters. The high purity necessary for drinking water has been maintained in the domestic water supply. (See also W74-09840) (Houser-ORNL)
W74-09847

1972 NATIONAL REACTOR TESTING STATION ENVIRONMENTAL MONITORING PROGRAM REPORT, (IDAHO FALLS, IDAHO).
Idaho Operations Office (AEC), Idaho Falls. Health Services Lab.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 597-628, August 1973. 6 fig, 9 tab.

Descriptors: *Monitoring, *Environment, *Measurement, *Background radiation, *Radioactivity, Air pollution, Water pollution, Water pollution sources, Tritium, Strontium, Fallout, Sampling, Wheat, Milk, Surface waters, Water wells, *Idaho.

None of the off-site well water or surface water samples contained any gross alpha, gross beta, or tritium activity above the detection limits of the analyses. The only fission or activation product detected in milk samples was Sr-90. However, the Sr-90 concentrations are similar to those reported for the region in the U.S. Environmental Protection Agency's Radiation Data and Reports, and the source is assumed to be fallout from nuclear device testing and not NRTS operations. Wheat samples collected at harvest also contained small amounts of Sr-90 from worldwide fallout. The results of the air monitoring program for 1972 indicated that on-site and off-site air concentrations resulting from NRTS releases were indistinguishable from the natural radioactivity in air. (See also W74-09840) (Houser-ORNL)
W74-09848

EFFLUENT AND ENVIRONMENTAL MONITORING REPORT FOR CALENDAR YEAR 1972 FOR THE BETTIS ATOMIC POWER LABORATORY, (PITTSBURGH, PENNSYLVANIA).
Bettis Atomic Power Lab., Pittsburgh, Pa.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 629-654, August 1973. 2 fig, 3 tab, 4 append.

Descriptors: *Monitoring, *Environment, Laboratories, *Research and development, *Nuclear powerplants, *Effluents, Radioactivity, Radioactive waste disposal, Safety, Evaluation, Standards, Regulation, Management, Air, Liquid, Silts, Streams, Measurement, Sampling, Analytical techniques, Public health, *Pennsylvania.

Results are summarized for the period from January through December 1972, of the effluent and environmental monitoring program conducted at the Bettis Atomic Power Laboratory. The program has been continuously maintained since 1959 and regulates the disposal of solid, liquid and airborne effluents from the laboratory. Since its inception, the data obtained from this program have shown

that the Laboratory's procedures for controlling effluents are adequate to ensure that all releases to the environment are made in accordance with the applicable requirements. The program includes sampling and analysis of exhaust air, liquid effluents, and silt and water samples from the small streams on the Laboratory site and in the nearby area. Evaluation of these data, along with the analysis of the environmental radiation measurements provides the basis for assessing the environmental impact due to Laboratory operations. (See also W74-09840) (Houser-ORNL)
W74-09849

KNOLLS ATOMIC POWER LABORATORY (SCHENECTADY, NEW YORK) ANNUAL ENVIRONMENTAL MONITORING REPORT CALENDAR YEAR 1972.
Knolls Atomic Power Lab., Schenectady, N.Y.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 655-698, August 1973. 4 fig, 7 tab, 8 ref.

Descriptors: *Monitoring, *Environment, Laboratories, *Effluents, *Radioactivity, *Measurement, Water quality control, Regulation, Standards, Abatement, Rivers, Waste disposal, Discharge(Water), Sampling, *New York, Analytical techniques.
Identifiers: *Mohawk River.

Regulations for the prevention, control and abatement of air and water pollution are in compliance with the requirements of AEC Manual Chapter 0510. Other documents provide additional guidelines. Water released from the Knolls Site enters the Mohawk River at a point approximately 40 ft from shore. This water has several sources, such as storm drainage, city water used in laboratory, sanitary and shop applications, and Mohawk River water. The average water discharge rate measured during 1972 was approximately 500 gallons per minute which represents less than 0.1% of the median Mohawk River flow rate. Of the volume discharged, approximately 60% is storm drainage and river water. A continuous proportional sample of the water released is collected and analyzed for those constituents suggested by New York State which are of importance in drinking water or stream standards. In addition, continuous measurements are made and recorded for flow, pH and temperature. Periodic samples are taken of the Mohawk River downstream and upstream of the Knolls Site to check on its water quality. The results show Knolls Site operations have had no significant effect on the Mohawk River. Combustion gas products are generated from the operation of the Site steam-generating systems. The sulfur content of the fuel used and smoke emissions meet State standards. (See also W74-09840) (Houser-ORNL)
W74-09850

ANNUAL EFFLUENT DATA AND ENVIRONMENTAL MONITORING REPORT OF THE SHIPPINGPORT ATOMIC POWER STATION, (PENNSYLVANIA).
Duquesne Light Co., Shippingport, Pa.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 699-712, August 1973. 2 fig, 2 tab, 2 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Monitoring, *Environment, Sampling, Water, Bottom sediments, *Ohio River, Instrumentation, Radioactivity, Measurement, Assay, Safety, Evaluation, Assessment, Regulation, Law enforcement, Water quality standards, Public health, Environmental effects, *Pennsylvania.
Identifiers: *Film badges.

Environmental monitoring was conducted during 1972 in the vicinity of the Shippingport Atomic Power Station. The Shippingport environmental monitoring program consists of sampling the water and bottom sediment of the Ohio River and posting film badges in the area of the power station. Releases of small quantities of radioactivity to the air and to the Ohio River are discussed. Additional analyses of the effluent from the portion of the facility which is operated under USAEC contract is performed to ensure that the water quality standards specified by Atomic Energy Commission Manual Chapter 0510 and the Commonwealth of Pennsylvania have been met. The results of environmental monitoring described show that Shippingport operations have not adversely affected the surrounding environment. (See also W74-09840) (Houser-ORNL)
W74-09851

ENVIRONMENTAL MONITORING REPORT FOR THE NEVADA TEST SITE AND OTHER TEST AREAS USED FOR UNDERGROUND NUCLEAR DETONATIONS - *JANUARY-DECEMBER 1972.
National Environmental Research Center, Las Vegas, Nev.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 713-866, August 1973. 18 fig, 10 tab, 14 ref.

Descriptors: *Monitoring, *Environment, *Nuclear explosions, *Radioactivity, Testing, Evaluation, Sampling, Water analysis, Soil analysis, Hydrology, On-site tests, Milk, Xenon, Plutonium, Radioisotopes, Fallout, Regulation, Public health, Data collections, *Nevada.
Identifiers: *Off-site monitoring, Weapons testing, China.

During 1972, the monitoring of gamma radiation levels and concentrations of radioactivity in the environs of the Nevada Test Site (NTS) was continued through the use of off-site networks of radiation dosimeters and gamma-rate recorders, air samplers, and selected locations at which monthly samples of water and milk were collected for radiological analyses. For each of the underground nuclear detonations and the seven experimental tests of the Nuclear Furnace-1, mobile radiation monitors equipped with radiation monitoring equipment and supplies were on standby in off-site locations to respond to any inadvertent release of radioactivity which might result in a radiological hazard to off-site populations and property. The only radioactivity produced by nuclear tests at NTS and detected off-site was Xe-133, which was observed in samples collected at stations of the Noble Gas and Tritium Sampling Network at Beatty, Diablo, and Hiko, Nevada. The levels of Xe-133, which were attributed to gaseous seepage from underground tests, occurred only in a few samples. These levels, averaged over the total period sampled during the year, were less than 0.04% of the Concentration Guide of the AEC Manual, Chapter 0524, for a population sample. All other increases in radioactivity concentrations observed in media collected around the NTS were attributed to seasonal variations in old atmospheric fallout and fallout from nuclear detonations by the People's Republic of China on January 7, 1972, and March 18, 1972. (See also W74-09840) (Houser-ORNL)
W74-09852

FEED MATERIALS PRODUCTION CENTER (CINCINNATI, OHIO) ENVIRONMENTAL MONITORING ANNUAL REPORT FOR 1972.
National Lead Co. of Ohio, Cincinnati.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 867-888, August 1973. 4 fig, 5 tab, 6 ref.

Descriptors: *Monitoring, *Environment, *Effluents, *Radioactivity, *Radium, *Uranium, *Thorium, Air, Water, Fuels, Soils, Sampling, Data collections, Analytical techniques, Regulation, Standards, Operations, Fabrication, *Ohio.
Identifiers: *Great Miami River, Production plant.

Environmental monitoring data collected at the Feed Materials Production Center (FMPC) during 1972 are summarized. Data are presented for both radioactive and non-radioactive contaminants in environmental samples. These data show that the average off-site concentrations of radioactive contaminants from FMPC operations were less than 0.5% of the guide levels published in AEC Manual Chapter 0524. The resulting off-site radiation exposures would, therefore, be a small fraction of the standards for uncontrolled areas. (See also W74-09840) (Houser-ORNL)
W74-09853

ENVIRONMENTAL MONITORING REPORT - UNITED STATES ATOMIC ENERGY COMMISSION - OAK RIDGE FACILITIES, CALENDAR YEAR 1972.
Oak Ridge Gaseous Diffusion Plant, Tenn.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 889-930, August 1973. 4 fig, 21 tab, 9 ref.

Descriptors: *Monitoring, *Environment, *Effluents, *Radioactivity, Atmosphere, Water, Air, Ecology, Fish, *Tennessee River, Industrial production, Research and development, Nuclear powerplants, Uranium, Waste disposal, Waste storage, Waste treatment, Nuclear reactors.
Identifiers: *Clinch River(Tenn), White Oak Creek(Tenn), Poplar Creek(Tenn), Bear Creek(Tenn).

The Environmental Monitoring Program for the Oak Ridge area includes sampling and analysis of air, water from surface streams, several food products, flora, and soil for both radioactive and nonradioactive materials. A summary is presented of the results of the program for calendar year 1972. Surveillance of radioactivity in the Oak Ridge environs indicates the atmospheric concentrations of radioactivity were not significantly different from other areas in East Tennessee. Concentrations of radioactivity in the Clinch River and in fish collected from the river were less than one percent of the permissible concentration and intake guides for individuals in the neighboring environment. Only very low-level radioactivity is being released to the environment from plant operations and the resulting concentrations in all of the media sampled were well below permissible standards. Surveillance of nonradioactive materials in the Oak Ridge environs shows that established limits were not exceeded for those materials possibly present in the air as a result of plant operations. (See also W74-09840) (Houser-ORNL)
W74-09854

ENVIRONMENTAL MONITORING REPORT - UNITED STATES ATOMIC ENERGY COMMISSION - PADUCAH GASEOUS DIFFUSION PLANT (KENTUCKY) - CALENDAR YEAR 1972.
Paducah Gaseous Diffusion Plant, Ky.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 931-956, August 1973. 1 fig, 13 tab, 6 ref.

Descriptors: *Monitoring, *Environment, *Effluents, *Radioactivity, *Ohio River, Air, Water, Soils, Water pollution, Water pollution sources, Regulation, Assessment, Safety, Evaluation, Industrial production, Fuels, Uranium, Chromium, *Kentucky.
Identifiers: *Big Bayou(Ky), *Little Bayou(Ky).

Air, water, soil, and grass in the vicinity of the Paducah Gaseous Diffusion Plant were continuously or periodically sampled during 1972. Analyses for materials known to be in plant effluents were made to provide effluent control i

formation and to determine compliance with applicable air and water quality standards. The air analyses for radioactivity indicate concentrations at all off-site sampling stations averaged less than one percent of the applicable Radioactivity Concentrations Guide. Air and grass off-site analyses for fluorides met the Kentucky air quality requirements. Soil samples collected to provide historical background data were analyzed for uranium. The results ranged from 1.1 ppm to 2.0 ppm at the AEC property boundary. None of these concentrations would be expected to have a significant impact on the environment. There was no detectable change in chemical, physical, or radioactive characteristics of either the Ohio River or ground water attributable to Paducah Gaseous Diffusion Plant operations. The results of water sample analyses of the Ohio River show the chromium and fluoride concentrations were in compliance with the requirements of the applicable Kentucky regulations. The concentration of hexavalent chromium at the mouth of the combined Big and Little Bayous is slightly in excess of the Ohio River Valley Sanitation Commission (ORSANCO) discharge standard of 0.05 ppm. Engineering and funding studies are in progress on chromium removal facilities. (See also W74-09840) (Houser-ORNL)
W74-09855

PORTSMOUTH GASEOUS DIFFUSION PLANT (OHIO) ENVIRONMENTAL MONITORING REPORT - 1972,
Goodyear Atomic Corp., Piketon, Ohio.
V. S. Emler, and S. H. Hullett.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 957-974, August 1973. 2 fig, 6 tab.

Descriptors: *Monitoring, *Environment, *Effluents, *Industrial production, *Radioactivity, Standards, Regulation, Measurement, Air pollution, Water pollution, Vegetation, Assessment, Safety, Evaluation, Sampling, Rivers, Streams, *Ohio.
Identifiers: *Scioto River(Ohio), *Big Beaver Creek(Ohio).

The ambient environmental standards that apply to the Portsmouth Gaseous Diffusion Plant are the radioactivity standards established by the AEC, the standards promulgated by the EPA for sulfur dioxide and particulate matter in air, and the public water-supply standards established by the Ohio Water Pollution Control Board (now the Ohio Environmental Protection Agency). At the Portsmouth Gaseous Diffusion Plant, the ambient atmosphere and all effluent streams are monitored and analyzed regularly for conformance to the applicable, specified standards. Also, because fluorides are used in the diffusion plant and because some states have established standards for fluorides in air, the concentrations of fluorides in the ambient atmosphere are measured routinely. Concentrations of fluorides in vegetation are measured because fluoride ingestion can cause adverse effects in livestock. None of the annual average concentrations of radioactivity measured at the many sampling points around the plant exceed 1.4% of the applicable standards. Background radiation levels are the same as they were in 1954 before the plant began to operate. Average concentrations of fluorides in air, fluorides in water, fluorides in vegetation, sulfur dioxide in air, and chromium in water are not excessive; average pH of water is within the specified range. Analyses for particulate matter in air showed concentrations in excess of those permitted by applicable standards, but the samples were collected only downstream from the steam plant, and, therefore, are not truly ambient averages. (See also W74-09840) (Houser-ORNL)
W74-09856

ANNUAL ENVIRONMENTAL MONITORING REPORT 1972 - LAWRENCE BERKELEY LABORATORY, (CALIFORNIA),
California Univ., Berkeley. Lawrence Berkeley Lab.
H. P. Cantelow.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 1115-1130, August 1973. 1 fig, 7 tab, 1 ref.

Descriptors: *Monitoring, *Environment, *Radioisotopes, *Radioactivity, Research and development, Effluents, Sampling, Analytical techniques, Discharge, Atmosphere, Radioactive waste disposal, Fallout, Streams, Drinking water, Standards, *California.

The use of radionuclides in the various individual research laboratories is the principal potential source of radioactive pollutants. Work on significant quantities of radioactive materials is confined to glove boxes. Each laboratory room has its own locally controlled exhaust system, discharging individually into the atmosphere. Over 100 such exhaust points exist, and are located on a number of different buildings throughout the site. Each of these is sampled and analyzed to be sure no significant quantities are released. Assessment of the possible impact of the Laboratory on its environment is carried out by two separate groups: All measurements of possible releases of radioactive materials to the environment are made by the Safety Services Department; measurements of potential gamma and neutron exposures from the operation of the many accelerators are carried out by the Health Physics Department. No radioisotopes identified as originating from LBL could be detected. (See also W74-09840) (Houser-ORNL)
W74-09857

ANNUAL ENVIRONMENTAL MONITORING REPORT OF STANFORD LINEAR ACCELERATOR CENTER (CALIFORNIA) - JANUARY-DECEMBER 1972,
Stanford Linear Accelerator Center, Calif.
D. D. Busick, and E. Holt.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 1177-1188, August 1973. 2 fig, 3 tab, 4 ref.

Descriptors: *Monitoring, *Environment, *Radioactivity, *Assessment, Background radiation, Fallout, Sampling, Analytical techniques, Soils, Vegetation, Groundwater, Surface waters, Storm sewers, Sewage effluents, Air, Public health, *California.
Identifiers: *Accelerators, *Weapons testing.

The Stanford Linear Accelerator Center (SLAC) regional surveillance program is intended to assess the contribution from SLAC operations, if any, to the existing radiation environment typically known as 'background radiation.' The term background radiation includes naturally occurring radioactive elements and man-made radio-elements usually from past atmospheric weapons' testing. Accordingly, samples of soil, vegetation, ground water, surface water, sanitary and storm sewers are periodically collected and activity levels determined. Airborne radioactivity is measured and recorded continuously at the release point. Continuous physical radiation measurements of neutron and gamma dose is also provided near the site boundary. Environmental and physical radiation monitoring locations are indicated. (See also W74-09840) (Houser-ORNL)
W74-09858

ENVIRONMENTAL MONITORING IN THE VICINITY OF THE SAVANNAH RIVER PLANT (SOUTH CAROLINA) - ANNUAL REPORT FOR 1972.
Du Pont de Nemours (E.I.) and Co., Aiken, S. C.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 1189-1217, August 1973. 4 fig, 12 tab, 10 ref, 4 append.

Descriptors: *Monitoring, *Environment, *Effluents, *Industrial production, *Nuclear reactors, Background radiation, Fallout, Radioactivity, Tritium, Cesium, Strontium, Water pollution, Fish, Sampling, Analytical techniques, Biota, Water quality, Administrative agencies, Public health, *South Carolina.
Identifiers: *Savannah River.

The quantity of radioactivity released by the Savannah River Plant (SRP) to its environs during 1972 is, for the most part, too small to be distinguished from natural background radiation and fallout from worldwide nuclear weapons tests. Particulate beta activity detectable in air is due entirely to global fallout. This concentration in air at the plant perimeter and 25 miles away represents 0.1% of the Concentration Guide. Tritium oxide in air at the plant perimeter is greater than in air at more distant locations; however, the average concentration at the plant perimeter is only 0.1% of the Concentration Guide. Tritium, cesium-137, and strontium-90 are the only radionuclides of plant origin detectable in river water. None of these had an average concentration that exceeded 0.2% of the Concentration Guide in river water sampled 8 miles downstream from the plant. Radioactive materials in river fish also continue to be very low. Various water-quality analyses of river water samples by SRP indicate that Savannah River water is not adversely affected by SRP operations. This is substantiated by surveys of the health of the Savannah River biota by the Academy of Natural Sciences of Philadelphia and pesticide analyses of river water and sediment by the United States Geological Survey Water Quality Laboratory, Washington, D.C. (See also W74-09840) (Houser-ORNL)
W74-09859

MOUND LABORATORY CHEMISTRY AND PHYSICS PROGRESS REPORT: JANUARY-MARCH 1972.
Mound Lab., Miamisburg, Ohio.
For primary bibliographic entry see Field 2K.
W74-09860

ENVIRONMENTAL MONITORING REPORT: JANUARY-JUNE 1972,
Mound Lab., Miamisburg, Ohio.
D. G. Carfagno, and W. H. Westendorf.
Available from NTIS, Springfield, Va. as Report No MLM-1973; $4.50/copy, $1.45 microfiche. Report No MLM-1973, October 1972. 18 p, 2 fig, 4 tab, 3 ref, append.

Descriptors: *Monitoring, *Environment, *Assay, *Polonium, *Plutonium, *Tritium, Measurement, Air, Water, Standards, Regulation, Food, Soils, Administrative agencies, Sampling, Analysis.

The environment surrounding Mound Laboratory, Ohio was monitored and is reported on for the first half of 1972. The average concentrations of polonium-210, plutonium-238, and tritium measured in air and water samples were well within the stringent standards adopted by the Atomic Energy Commission and the Environmental Protection Agency. (Houser-ORNL)
W74-09861

OCEANIC ATMOSPHERIC DISPERSION,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5C.
W74-09865

FALLOUT PROGRAM--QUARTERLY SUMMARY REPORT, SEPTEMBER 1, 1973, THROUGH DECEMBER 1, 1973,
Health and Safety Lab. (AEC), New York.

E. P. Hardy, Jr.
Available from NTIS, Springfield, Va., as Rept No HASL-278; $7.60/copy, $1.45/microfiche. Report No HASL-278, January 1974. 171 p, 8 fig, 28 tab, 62 ref, 1 biblio.

Descriptors: *Radioactivity, *Fallout, *Surveys, *Sampling, Analytical techniques, Laboratories, Data collections, Air pollution, Water pollution, Soil contamination, Domestic water, Safety, Evaluation, Public health, Illinois.

Current data are presented from the HASL Fallout Program and the Radiological and Environmental Research Division at Argonne National Laboratory. Interpretive reports and notes are included on the dose to man from Pu-239 fallout; the respirable fraction of Sr-90, Pu-239, and stable lead in surface air; Cs-137 and Sr-90 in bone; the quality of 1972 surface air analyses; and quality control of 1973 samples of fallout, diet, tap water, and human bone. A bibliography of recent publications related to radionuclide studies is also presented. (See also W74-09870) (Houser-ORNL)
W74-09869

FALLOUT PROGRAM--QUARTERLY SUMMARY REPORT--JANUARY 1, 1973, THROUGH DECEMBER 1, 1973, APPENDIX,
Health and Safety Lab. (AEC), New York.
E. P. Hardy, Jr.
Available from NTIS, Springfield, Va., as Rept No HASL-278 Append., $10.60/copy, $1.45/microfiche. Report No HASL-278 Appendix, January 1974. 460 p.

Descriptors: *Radioactivity, *Radioisotopes, *Fallout, *Surveys, Data collections, Air pollution, Water pollution, Strontium, Lead, Milk.

Current data are presented from the HASL fallout program. The Appendix includes tabulations of radionuclide levels in fallout, surface air, stratospheric air, milk, diet, and tap water. (See also W74-09869) (Houser-ORNL)
W74-09870

RADIOACTIVE FALLOUT IN AIR AND RAIN: RESULTS TO THE MIDDLE OF 1973,
Atomic Energy Research Establishment, Harwell (England).
For primary bibliographic entry see Field 5B.
W74-09876

RADIOLOGICAL MONITORING PROGRAM--PERIOD COVERING MAY 17, 1973, THRU JULY 31, 1973, FOR CER GEONUCLEAR CORPORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Sante Fe, N.Mex. Santa Fe Lab.
For primary bibliographic entry see Field 5B.
W74-09878

DETERMINATION OF LABILE AND STRONGLY BOUND METALS IN LAKE WATER,
Canada Centre for Inland Waters, Burlington, (Ontario).
Y. K. Chau, and K. Lum-Shue-Chan.
Water Research, Vol 8, No 6, p 383-388, June 1974. 1 fig, 3 tab, 17 ref.

Descriptors: *Polarographic analysis, *Trace elements, Chelation, Aqueous solutions, Chemical analysis, Water analysis, Electrochemistry, Analytical techniques, Zinc, Cadmium, Lead, Copper.
Identifiers: *Lake water.

Differential pulse anodic stripping voltammetry was applied to differentiate and determine the labile and strongly bound forms of Zn, Cd, Pb and Cu in lake water without preconcentration of the sample. The sensitivities as established for an oxidation peak current of 0.020 microamp are: 0.2 ppb for Zn, 0.4 ppb Cd, 0.7 ppb Pb and 0.5 ppb for Cu. Interferences of cations and anions and the choice of a buffer system are discussed. The method was applied to study a number of small lakes in the Sudbury area, Ontario, Canada. (Knapp-USGS)
W74-09896

INFLUENCE OF SELECTED ORGANIC COMPOUNDS ON THE RESPONSE OF A CALCIUM ION-SELECTIVE ELECTRODE,
Montana State Univ. Bozeman. Dept. of Chemistry.
G. K. Pagenkopf, and K. A. Buell.
Water Research, Vol 8, No 6, p 375-376, June 1974. 1 tab, 7 ref.

Descriptors: *Electrodes, *Electrochemistry, *Organic compounds, *Calcium, *Water analysis, Ion exchange, Phenols, Chemical analysis.

The influence of some naturally occurring organic compounds on the response of a calcium ion-selective electrode was investigated. Phenol, resorcinol, phthalate, salicylate and humic acid cause significant interference when their concentrations are greater than 10 mg per liter. (Knapp-USGS)
W74-09897

MEASUREMENT AND MANAGEMENT ASPECTS OF WATER TOXICOLOGY: THE MALIBU WATERSHED A MIXED RESIDENTIAL AND WILDNESS AREA,
California Univ., Los Angeles. School of Public Health.
For primary bibliographic entry see Field 5B.
W74-09950

OIL-POLLUTION DETECTOR FOR USE ON MARINE PETROLEUM OPERATING/STORAGE PLATFORM - USING U-TUBE APPTS.
Texaco Development Corp., New York.
Belgian Patent 803,742. Issued February 18, 1974.
Derwent Belgian Patents Report, Vol 5, No 9, p 1, April, 1974.

Descriptors: *Oil pollution, *Patents, *Density, Equipment, Oil, Water levels, *Pollutant identification.
Identifiers: *Detectors, Belgium.

An oil pollution detector is described for detection of a liquid contaminant in a stream of liquid of a different density. The stream enters a U-tube having an outlet limb at a predetermined height. The level of the liquid is detected and the variations in level are determined and show the presence of liquid contaminant in the stream of liquid. The liquid contaminant is preferably petroleum and the uncontaminated stream of liquid is water. (Merritt-FIRL)
W74-10033

RESULTS FROM MULTI-TRACE-ELEMENT NEUTRON ACTIVATION ANALYSES OF MARINE BIOLOGICAL SPECIMENS,
California Univ., Irvine. Dept. of Chemistry.
V. P. Guinn, and R. Kishore.
Journal of Radioanalytical Chemistry, Vol 19, No 2, p 367-371, 1974. 6 ref.

Descriptors: *Mercury, *Marine fish, Marine biology, *Radioactivity effects, Measurements, Sampling, Pacific Ocean, Zinc, Aquiculture, *Trace elements, *Pollutant identification.
Identifiers: Albacore, Dolphins, Killer whales, Aliquots, Selenium, Muscle tissue, *Neutron activation analysis.

Traces of mercury in marine specimens had been previously investigated and this study showed the reproducibility of replicate analyses of a given sample and of different samples (aliquots) of the same tissue from a given marine specimen. Data were obtained on the Hg, Se, and Zn levels for several different species of Pacific Ocean fish and mammals. Three variables which affect the levels of these trace elements include species, tissue, and size or age of the specimen. Sample dissection was carefully conducted and specimen size was recorded for a large number of specimens. Whereas Hg, Se, and Zn all appear to concentrate markedly in the liver of marine mammals such as dolphins and killer whales (relative to their levels in muscle tissue), only the latter two appear to concentrate appreciably in the liver of large fish such as the albacore. (Prague-FIRL)
W74-10049

CONCENTRATION AND DISTRIBUTION OF TRACE ELEMENTS IN THE MAUMEE RIVER BASIN, OHIO, INDIANA AND MICHIGAN,
Ohio State Univ., Columbus. Dept. of Geology and Mineralogy.
For primary bibliographic entry see Field 5B.
W74-10084

METHOD WITH RADIOTRACERS AND EXPERIMENTS IN HYDROCARST STRUCTURES,
Academia R. S. R., Bucharest. Institutul de Fizica Atomica.
E. Gaspar.
Available from NTIS, Springfield, Va., as Rept. No. IFA-MR-39; $3.25 paper copy, $1.45 microfiche. Report No. IFA-MR-39, 1973. 25 p, 17 fig, 1 tab, 6 ref.

Descriptors: Groundwater, *Groundwater movement, Subsurface waters, *Subsurface flow, Geology, *Karst hydrology, Hydrology, Radioactive tracers, *Hydrogeology, Inflow, Discharge(Water), Meteorology, Aquifers.
Identifiers: *Radioactive tracers.

The study of ground water circulation in karst zones and the determination of hydrogeological flow parameters in hydrokarst structures are generally difficult, due to the complexity of the investigated medium as well as to the lack of efficient investigation means. The hydrogeological phenomena of karst formations can be known if the usual means of investigation are coupled with techniques using radioactive tracers. (Houser-ORNL)
W74-10108

ENVIRONMENTAL RADIOACTIVITY ANNUAL REPORT, 1972.
National Radiation Lab., Cristchurch, (New Zealand).
Available from NTIS, Springfield, Va., as Re.00pt. No. NRL-F-50; $4.00/copy, $1.45/microfiche. Report No. NRL-F-50, April 1973. 36 p, 11 fig, 13 tab, 8 ref, append.

Descriptors: *Monitoring, *Environment, *Fallout, *Nuclear explosions, *Testing, *Radiation, Sampling, Radioisotopes, Critical path method, Public health, Rain, Milk, Meteorology, Strontium, Pacific Ocean.
Identifiers: *New Zealand, Critical radionuclide.

This report continues the re-designed series of annual reports concerned mainly with long-term levels of environmental radioactivity in New Zealand and at Fiji and Rarotonga. The types of samples measured and the collecting stations are shown. The present report should be read in conjunction with the 1971 annual report -- the first of the new style reports -- which summarized earlier reports, and discussed global fallout and specific radionuclides of potential health significance. During June and July 1972, France conducted her sixth series of nuclear tests in the South Pacific. The results of the extended program monitoring short term levels of fallout from these tests were recently published and compared with levels moni

tored during earlier French test series. (Houser-ORNL)
W74-10112

RADIOLOGICAL MONITORING PROGRAM, PERIOD COVERING JULY 1, 1972, THROUGH SEPTEMBER 30, 1972, FOR CER GEONUCLEAR CORPORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Santa Fe, N. Mex. Dept. of Nuclear Sciences.
Available from NTIS, Springfield, Va., as Rept. No. PNE-RB-51-4; $4.00/copy, $1.45/microfiche. Report No. PNE-RB-51-4, 1972. 18 p, 14 tab.

Descriptors: *Environment, *Monitoring, *Assay, *Radioactivity, Background radiation, Evaluation, Safety, Assessment, Public health, Air pollution, Water pollution, Milk, Fish, Food chains, Nuclear explosions, Sites, Streams, Lakes, Ponds, Radioisotopes.
Identifiers: *Project Rio Blanco, *Project Plowshare.

Beta radioactivity in air particulate samples for this quarter (July-September, 1972) remained at very low concentrations, ranging from 0.01 to 0.14 pCi/m3. TLD data for this quarter indicated an average background radiation dose of 3.0 millirem per week. This is consistent with the data obtained for the second quarter. Beta radioactivity in surface water ranged from 0.0 to 10.5 pCi/1. These results were in agreement with other data obtained by Eberline. Tritium concentrations were less than 1.0 pCi/ml. Gamma scans indicated no detectable activity above background and system sensitivity. Beta radioactivity in milk was consistent with the second quarter results. This beta radioactivity is due to natural K-40. Gamma scans indicated no detectable activity. Strontium-89 was not detected in any of the fish samples. The concentrations of Sr-90 in fish were consistent with other results obtained by EIC. The gamma scan indicated no detectable radioactivity other than natural occurring K-40. (Houser-ORNL)
W74-10114

RADIOLOGICAL MONITORING PROGRAM: PERIOD COVERING APRIL 1, 1972, THROUGH JUNE 30, 1972, FOR CER GEONUCLEAR CORPORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Santa Fe, N.Mex. Dept. of Nuclear Sciences.
Available from NTIS, Springfield, Va., as Rept. No. PNE-RB-51-3; $4.00/copy, $1.45/microfiche. Report No. PNE-RB-51-3, 1972. 22 p, 16 tab.

Descriptors: *Environment, *Monitoring, *Radioactivity, *Assay, Background radiation, Safety, Evaluation, Assessment, Air pollution, Water pollution, Soil contamination, Nuclear explosions, Fallout, Streams, Lakes, Ponds, Milk, Fish, Food chains.
Identifiers: *Project Rio Blanco, *Project Plowshare.

Beta radioactivity in air samples for this quarter (April-June 1972) ranged from 0.12 to 0.53 pCi/m3. These values are consistent with values reported by the Environmental Protection Agency (EPA) Air Surveillance Network. Gamma scans of the air particulate samples (composites) indicated trace amounts of radionuclides attributable to worldwide fallout. TLD data showed an average radiation background of 2.9 millirem per week. Beta radioactivity in surface water ranged from 0.0 to 11.6 pCi/1. Concentrations of radioactive material were too low to measure by direct gamma spectrometry. Tritium concentrations were below 1 pCi/ml. Tritium concentrations in soil moisture were too low to measure by liquid scintillation counting. Gamma scans indicated that soil radioactivity was due primarily to naturally occurring potassium, uranium, and thorium. Beta radioactivity in milk ranged from 1250 to 1740 pCi/1 and was due almost entirely to natural K-40. Sr-90 in vegetation ranged 0.66 to 1.79 pCi/g based on dry weight. Sr-89 was not detectable in any of the samples. Gamma scans did not detect any radioactivity except natural K-40. (Houser-ORNL)
W74-10115

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING THE MILLSTONE NUCLEAR POWER STATION, WATERFORD, CONNECTICUT, AUGUST 29 AND SEPTEMBER 11, 1969.
EG and G, Inc., Las Vegas, Nev.
Available from NTIS, Springfield, Va., as Rept. No. ARMS-69-6-5; $4.00/copy, $1.45/microfiche. Report No. ARMS-69-6-5, May 1974. 18 p, 3 fig, 3 tab, 3 ref.

Descriptors: *Monitoring, *Nuclear powerplants, *Radioactivity, Background radiation, *Radioisotopes, Gamma rays, Environment, Air, Water, Soil, *Data collections, *Aerial sensing, *Remote sensing, Instrumentation, Aerial reconnaissance.

The Aerial Radiological Measuring System (ARMS) was used to survey the area surrounding the Millstone Nuclear Power Station during August 1969. The survey measured terrestrial background gamma radiation. A high-sensitivity detection system collected gamma-ray spectral and gross-count data. The data were then computer processed into a map of a 450-square-mile area showing isoexposure contours three feet above the ground. Exposure rates and isotopes identified are consistent with normal terrestrial background. (Houser-ORNL)
W74-10120

GROUND BASED OBSERVATIONS SUPPORTING THE SHIPPINGPORT PENNSYLVANIA, AERIAL RADIATION SURVEY OF FEBRUARY 1973.
EG and G, Inc., Las Vegas, Nev.
Available from NTIS, Springfield, Va., as Rept. No ARMS-73-6-2; $4/copy, $1.45/microfiche. Report No ARMS-73-6-2, May 1974. 18 p, 4 fig, 5 ref.

Descriptors: *Monitoring, *Assay, Measurement, *Radioactivity, *Air pollution, *Water pollution, *Soil contamination, Cesium, Sampling, *Remote sensing, Aerial sensing, Aerial reconnaissance, Soil moisture, Assessment, Snow cover.
Identifiers: Ground observations.

Soil samples and tissue-equivalent dose measurements were obtained at three ground sites beneath two aerial flight lines in the Shippingport, Pennsylvania, survey area. This work was done in support of the aerial radiological survey at Shippingport on February 24, 1973. The soil samples contained naturally occurring isotopes and Cs-137 only. The Cs-137 concentration varied from 0.46 to 0.85 picocuries per gram of dry soil. The tissue-equivalent dose measurments ranged in value from 7.8 to 9.5 micro-Rad/hr, and compare well with the gamma exposure rates measured by the Aerial Radiological Measuring System (ARMS). (Houser-ORNL)
W74-10121

SEPARATION OF CLAY MINERALS AND SOIL CLAYS USING ISOPYCNIC ZONAL CENTRIFUGATION,
Oak Ridge National Lab., Tenn.
C. W. Francis, T. Tamura, W. P. Bonner, and J. W. Amburgey, Jr.
Soil Science Society of America Proceedings, Vol 34, No 2, p 351-352, March-April 1970. 2 fig, 6 ref.

Descriptors: *Analytical techniques, *Centrifugation, *Water purification, *Water treatment, *Clays, Clay minerals, Soils, Soil density, Density, Physical properties, Research and development, Silts, Loam.
Identifiers: *Zonal centrifugation, *Density gradient, Dodge silt loam.

The technique of isopycnic-zonal centrifugation in a continuous nonaqueous density gradient was used in the purification and separation of standard clay minerals and soil clays. A suspending agent (polyvinylpyrrolidone) compatible with tetrabromoethane and ethanol stabilized clay suspensions produced multiple banding of systems which otherwise flocculated into one band. Data from x-ray diffraction analyses revealed the technique is useful in purification of clay minerals and identification of clay minerals in soil clays; however, the banding obtained from the clay fraction of a Dodge silt loam did not represent discrete bands of specific clay minerals. (Houser-ORNL)
W74-10125

BACTERIAL POLLUTION INDICATORS IN THE INTESTINAL TRACT OF FRESHWATER FISH,
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
E. E. Geldreich, and N. A. Clarke.
Applied Microbiology, Vol 14, No 3, p 429-437, May, 1966, 2 fig, 7 tab, 19 ref.

Descriptors: *Bacteria, *Freshwater fish, *Coliforms, Sampling, Temperature, *Bioindicators, *Ohio, *Streptococcus, *Pollutant identification.
Identifiers: Bacterial pollution indicators, Intestinal tract(Fish), *Little Miami River(Ohio).

A study was made of the occurrence, distribution, and persistence of coliforms, fecal coliforms, and fecal streptococci in the intestinal tract of freshwater fish. A total of 132 fish representing 14 different species were used in various phases of these experiments. Examination of the intestinal contents of 78 fish from moderately polluted sections of the Little Miami River indicated that fecal coliform densities were lowest in bluegills and highest in catfish. Levels of fecal streptococci for these two species were 220 and 240,000 per gram, respectively. The occurrence of fecal coliforms in fish caught in this stream reflected the warm-blooded-animal-pollution level of the water. All fish used were caught during July, August, and September when the water temperatures were between 13 and 18C. The fate of fecal coliforms and Streptococcus feacalis in the fish intestine indicated that these organisms can probably survive and multiply when fish and water temperatures are 20C or higher, but only when the organisms are retained in the gut for periods beyond 24 hr. (Cartmell-East Central)
W74-10131

USE OF CAISSONS FOR SAMPLING CHEMICAL AND BIOLOGICAL CONDITIONS BENEATH A BEEF FEEDLOT,
Nebraska Univ., Lincoln.
L. F. Elliott, T. M. McCalla, N. P. Swanson, and F. G. Viets, Jr.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 14, No 6, p 1018-1019, November-December, 1971. 4 fig, 2 tab, 2 ref.

Descriptors: *Feed lots, *Caissons, *Sampling, *Biological properties, *Soil chemical properties, Surface-groundwater relationships, Soil contamination, Cattle, Soil gases, Pollutant identification, Air pollution.

The caisson installation allows soil gas and soil solution to be taken from the same sites, in the feedlot soil profile, over extended periods of time. These samples provide a measure of the chemistry and biological activity under a feedlot which would be extremely difficult without the benefit of the caisson installation. The sampling equipment required for this study is delicate and requires protection from the feedlot environment. To protect the instruments, large cylindrical compartments, or caissons, equipped with access ports, are inserted into the feedlot soil profile. Values obtained

indicate the system will permit the measurement of the effect of feedlot management on the downward movement of pollutants. (Ballard-East Central)
W74-10138

DEVELOPMENT OF SAMPLE PREPARATION METHODS FOR ANALYSIS OF MARINE ORGANISMS,
Southwest Research Inst., Houston, Tex.
H. C. McKee, and D. S. Tarazi.
Copy Available from GPO Sup Doc as EP1.23:660/3-74-026, $1.05; microfiche from NTIS as PB-234 201 $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-74-026, January 1974. 59 p, 7 fig, 1 tab, 49 ref, 2 append. EPA Project 16020 EGG.

Descriptors: *Analytical techniques, *Gas chromatography, Aromatic compounds, Nitrogen compounds, Pesticides, Organic compounds, Solvent extractions, Chlorinated hydrocarbon pesticides, *Marine animals, *Pollutant identification.
Identifiers: *Sample preparation, Ketones, Phenols, Esters.

A two-year laboratory investigation has been completed to develop laboratory methods for processing, extracting, purifying, concentrating, and measuring specific organic pollutants found in marine organisms. Major conclusions are as follows: (a) Quantitative measurement of many organic contaminants is possible in the range of 0.2 to 0.5 parts per million in a 5-g sample. (b) Qualitative detection is possible at concentrations below the limit of quantitative measurement, thus providing a means of identifying the presence of organic contaminants at levels far below any known threshold of toxicity or other adverse effects for most organic compounds. (c) Compounds tested in laboratory studies included saturated hydrocarbons to C22, aromatics to C9, alcohols to C7, amines to C6, glycols to C6, unsaturated hydrocarbons to C10, as well as various ketones, phenols, esters, heterocyclic compounds, acids, sulfides, amides, and chlorinated hydrocarbons. With most of these, recovery of 70 to 90 percent of the amount present was obtained, indicating that quantitative measurements are possible within the ranges stated above. (d) Several methods of sample preparation can be used prior to analysis by gas chromatography. (e) Based on the results obtained, the analysis of almost any variety of marine specimens should be possible to measure trace organic constituents. (Hegre-EPA)
W74-10190

APPLICATION OF POLARIZATION MEASUREMENTS IN TRACING TECHNIQUES,
Rhode Island Univ., Kingston.
For primary bibliographic entry see Field 5B.
W74-10203

A CAPILLARY TUBE DIFFUSION CELL FOR MEASURING ION DIFFUSION IN AQUEOUS SOLUTIONS,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
D. A. Brown.
Soil Science Society of America Proceedings, Vol 38, No 3, p 533-535, May-June 1974. 1 fig, 1 tab, 9 ref.

Descriptors: *Diffusion, *Ion transport, *Aqueous solutions, Laboratory tests, Equipment, *Strontium radioisotopes, *Sodium, *Pollutant identification.
Identifiers: *Rubidium.

For measuring ion diffusion, a capillary tube diffusion cell unit is described with directions for its preparation and use. Self-diffusion data for Sr, Rb, and Na in single and mixed ion systems and one herbicide are reported. Values can be routinely obtained with coefficient of variations below 3%. (Knapp-USGS)
W74-10207

FISSION PARTICLE TRACKS IN MICAS AND MICACEOUS VERMICULITES AS RELATED TO CHEMICAL WEATHERING AND CATION EXCHANGE PROPERTIES,
Wisconsin Univ., Madison. Dept. of Soil Science.
S. Y. Lee, M. L. Jackson, and I. B. Sachs.
Soil Science Society of America Proceedings, Vol 38, No 3, p 423-428, May-June 1974. 5 fig, 2 tab, 25 ref.

Descriptors: *Ion exchange, *Weathering, *Radiochemical analysis, Uranium radioisotopes, Radioactive dating, Potassium, *Cation exchange, Adsorption, Leaching, Neutron activation analysis.
Identifiers: *Nuclear fission tracks, *Micas.

Weathering may be accelerated along fission particle tracks from U-238 impurities in natural micas and micaceous vermiculites. These tracks were observed by scanning electron microscopy after hydrofluoric acid etching. Track frequency was increased by neutron activation. Without HF etching, the average rate of interlayer K released from micas saturated with U02 and activated were 40 to 50% higher than that from nonactivated samples. Activated U02 saturated micaceous vermiculites liberated more K, Fe, and Si(OH) compared to controls. Weathering of micaceous minerals in nature would thus be accelerated by the additional diffusion of interlayer and structural cations through the natural fission particle tracks. The cation exchange capacity of the activated micaceous vermiculites increased from 16 to 25 meq/100g in one sample and from 6 to 12 meq/100g in another sample, while much less change occurred in controls. The observed higher K selectivity (relative to Ca) of the activated samples compared to the controls indicates that activation provided an increase in edge wedge sites for the selective adsorption of fixing cations. (Knapp-USGS)
W74-10214

RECONNAISSANCE OF WATER QUALITY IN THE VICINITY OF SUNNILAND OIL FIELD, COLLIER COUNTY, FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W74-10240

BUREAU OF MINES ENVIRONMENTAL ACTION PROGRAMS FOR NORTHEASTERN PENNSYLVANIA--REFUSE BANK REMOVAL; SUBSIDENCE MONITORING,
MITRE Corp., McLean, Va.
R. W. Bee, R. J. Buck, W. E. Jacobsen, S. H. Lubore, and R. P. Pikul.
Washington Operations Report MTR-6165, April 1972. 559 p, 129 fig, 72 tab, 13 ref.

Descriptors: *Coal mine wastes, *Subsidence, *Water pollution control, Land subsidence, Acid mine water, Mining, Mine wastes, *Pennsylvania, Monitoring.
Identifiers: Lackawanna Valley(Penn).

All coal mine refuse banks in the Lackawanna Valley of Pennsylvania were examined by field surveys, aerial photographs, topographic maps, and the results of other investigations. A total of 80 banks, containing about 77 million cubic yards of refuse and occupying approximately 3000 acres, were identified as feasible candidates for removal. Subsurface voids of old mines are logical disposal sites. Promising systems for the detection and tracking of earth surface subsidence were evaluated. Tiltmeters are somewhat more suitable for application in open, undeveloped land; strain gages can be used advantageously in commercial type construction; and for private residences, photoelastic patches have potential application. (Knapp-USGS)
W74-10270

PRESERVATION OF SOIL SAMPLES FOR INORGANIC NITROGEN ANALYSES,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W74-10334

5B. Sources Of Pollution

DISTRIBUTION OF TRACE METALS IN A WARM WATER RELEASE IMPOUNDMENT,
Quachita Baptist Univ., Arkadelphia, Ark.
For primary bibliographic entry see Field 2H.
W74-09801

A PRELIMINARY REPORT ON URBAN HYDROLOGY AND URBAN WATER RESOURCES: OAHU, HAWAII,
Hawaii Unin., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 2A.
W74-09803

AQUATIC FUNGI IN RIVERS: THEIR DISTRIBUTION AND RESPONSE TO POLLUTANTS,
Virginia Polytechnic Inst. State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-09810

LITTER AND SOIL MICROBIAL DYNAMICS IN A DECIDUOUS FOREST STAND,
Oak Ridge National Lab., Tenn.
B. S. Ausmus, and M. Witkamp.
Avail: NTIS, Springfield, Va., as Rept. No. EDFB-IBP-73-10; $7.60/copy, $1.45/microfiche. Report No. EDFB-IBP-73-10, February 1974. 202 p, 26 fig, 50 tab, 155 ref, 2 append.

Descriptors: *Deciduous forests, *Forest soils, *Microbial degredation, Water pollution sources, *Litter, *Hardwood, Biomass, Temperature, Carbon cycle, Carbon dioxide, Correlation analysis, Dynamics, Topography, Biomes, Ecosystems, Ecology, Aanlysis, *Tennessee.
Identifiers: Liriodendron tulipifera.

A second-growth mesic hardwood stand dominated by Liriodendron tulipifera and located near Oak Ridge, Tennessee, was the site of a study of forest floor microbial dynamics. The litter is mull type; the soil is alluvial. The area is located on karst topography. Annual soil temperatures ranged from 3 to 15C at 5 cm depth. Moisture in the forest floor is rarely less than field capacity. Some of the microbial dynamics aspects discussed are: (1) Detrital input and particle size; (2) Litter substrate quality changes; (3) Microbial biomass correlations with temperature and carbon dioxide; and (4) frequency of occurrence of microbial genera. (Houser-ORNL)
W74-09823

MODELS AND COMPUTER CODES FOR EVALUATING ENVIRONMENTAL RADIATION DOSES,
Battelle-Pacific Northwest Labs., Richland, Wash.
J. K. Soldat, N. M. Robinson, and D. A. Baker.
Avail: NTIS, Springfield, Va., as Rept. No. BNWL-1754; $7.60/copy, $1.45/microfiche. Report No. BNWL-1754, February 1974. 168 p, 3 fig, 23 tab, 22 ref, append.

Descriptors: Environment, Safety, Evaluation, Toxicity, *Radioactivity, *Model studies, *Computer models, *Computer programs, *Radioisotopes, Iodine, Tritium, Aquatic life, Food chains, Effluents, Liquids, Gases, Human population, Public health.

A simplified model for calculation of radiation doses from radioactive effluents was developed and programmed into a conversational language, providing fast turnaround time. The new model is divided into four independent parts, each written as a separate program - ARRRG: Calculates individual and population doses from liquid effluents. CRITR: Calculates internal radiation doses to four common classes of aquatic organisms and to organisms which consume them. FOOD: Calculates doses from consumption of food crops and animal products produced on irrigated farms. GRONK: Calculates doses from gaseous effluents to individuals and to the total population within 50 miles. The model can be used to calculate radiation doses to the total body and selected organs of individuals and population groups, and to organisms other than man. It includes all air and liquid exposure pathways thought to be significant and for which a reasonable amount of supporting data is available. Internal doses to man are based on a 1-year radionuclide intake, assuming no prior accumulation in the body. The radionuclide content of ingested food is assumed to be at equilibrium with the environment. The models are discussed in detail and the programs ARRRG, CRITR, and GRONK are described. The program FOOD is still being developed. (Houser-ORNL)
W74-09824

IODINE METABOLISM IN CHILDREN AND ADOLESCENTS IN AN AREA OF THE COMMUNITY,
Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 5C.
W74-09827

RADIOBIOLOGY AND RADIOECOLOGY OF FARM ANIMALS.
Atomizdat, Moscow (USSR).
For primary bibliographic entry see Field 5C.
W74-09828

PUBLICATIONS 1973.
Du Pont de Nemours (E.I.) and Co., Aiken, S.C. Savannah River Lab.
Aval: NTIS, Springfield, Va., Rept. No. DP-929, Rev 2; Suppl. 2; $4/copy, $1.45/microfiche. Report No. DP-929, Rev. 2, Supplement 2, February 1974. H. S. Hilborn, compiler.

Descriptors: *Bibliographies, *Documentation, *Publications, Research and development, Computer programs, *Nuclear energy, *Radioactivity, Air pollution, Water pollution, Soil contamination, *South Carolina.
Identifiers: Savannah River(So.Car.).

This compilation includes research and development reports, journal articles, contributions to books, computer programs, and other items published by Du Pont under its contract with the Atomic Energy Commission. The information was compiled by machine methods to produce bibliographic, subject, and author listings. This supplement updates the information included in DP-929, Rev. 2, Publications, 1951 through 1971, and DP-929, Rev. 2, Supplement 1, Publications, 1972 to include 1973. The bibliographic listing is arranged alphabetically by the first-mentioned author of each publication. The listing includes an identifying code number derived from the author's name, the publication date, and the title. The subject listing is arranged alphabetically by key word in context (KWIC) indexing of the titles. The listing includes the identifying code number to cross reference the subject and bibliographic listings. The author listing includes in alphabetical order all authors, coauthors, editors, and compilers with identifying code number, for all publications on which their names appear. (Houser-ORNL)
W74-09832

TRACE ELEMENT MEASUREMENTS AT THE COAL-FIRED ALLEN STEAM PLANT - PROGRESS REPORT, JUNE 1971 TO JANUARY 1973,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-09833

NSF-RANN TRACE CONTAMINANTS ABSTRACTS.
Oak Ridge National Lab., Tenn. Toxic Materials Information Center.
For primary bibliographic entry see Field 5A.
W74-09835

DISTRIBUTION AND RELEASE OF TRITIUM IN HIGH-TEMPERATURE GAS-COOLED REACTORS AS A FUNCTION OF DESIGN, OPERATIONAL, AND MATERIAL PARAMETERS,
Oak Ridge National Lab., Tenn.
E. L. Compere, S. H. Freid, and C. W. Nestor.
Aval: NTIS, Springfield, Va., as Rept. No. ORNL-TM-4303; $5.45/copy, $1.45/microfiche. Rept No. ORNL-TM-4303, June 1974. 97 p, 1 fig, 2 tab, 24 ref, 3 append.

Descriptors: *Tritium, *Productivity, *Nuclear powerplants, *Effluents, Computer program, Forecasting, Assessment, Streams, Water pollution, Environmental effects, Equations, Public health, *Nuclear reactors.

Tritium will be produced in high-temperature gas-cooled reactors not only by fission, but also to a significant extent by reactions of neutrons with boron in burnable poison and control rods, with trace lithium impurity, and with He-3 occurring naturally in the helium coolant flowing through the core. A portion of the tritium that is formed in solids or fuel may be released to the coolant. This tritium mingles with the hydrogen in the coolant and will, in part, chemisorb on graphite. In addition, it may leak with the coolant from the reactor vessel, be removed in the helium purification system, or permeate system walls into the steam generator, where as a result of removal (blowdown) or losses it is subject to release to the environment. The differential equations describing the above behavior are developed. Assumption of steady conditions, including hydrogen concentration, for a period makes it possible to express the distribution as well as the production in the form of coupled sets of linear first-order ordinary differential equations. A generalized analytical solution of these is presented. (Houser-ORNL)
W74-09838

ENVIRONMENTAL MONITORING AT MAJOR U.S. ATOMIC ENERGY COMMISSION CONTRACTOR SITES, CALENDAR YEAR 1972.
Division of Operational Safety (AEC), Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-09840

ENVIRONMENTAL MONITORING AND POLLUTANT INVENTORY PROGRAM REPORT FOR PANTEX PLANT (AMARILLO, TEXAS), COVERING CALENDAR YEAR 1972.
Mason and Hanger - Silas Mason Co., Inc., Amarillo, Tex.
For primary bibliographic entry see Field 5A.
W74-09841

ENVIRONMENTAL MONITORING REPORT, 1972, PINELLAS PLANT, ST. PETERSBURG, FLORIDA.
General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.
For primary bibliographic entry see Field 5A.
W74-09842

ANNUAL ENVIRONMENTAL MONITORING REPORT - ROCKY FLATS PLANT, (COLORADO), JANUARY THROUGH DECEMBER, 1972,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 5A.
W74-09843

ENVIRONMENTAL REPORT FOR CALENDAR YEAR 1972 ON RADIOLOGICAL AND NON-RADIOLOGICAL PARAMETERS, (BATTELLE COLUMBUS LABORATORIES, OHIO).
Battelle Columbus Lab., Ohio. Health Physics Services.
For primary bibliographic entry see Field 5A.
W74-09844

1972 ENVIRONMENTAL MONITORING REPORT - BROOKHAVEN NATIONAL LABORATORY, (NEW YORK).
Brookhaven National Lab., Upton, N.Y.
For primary bibliographic entry see Field 5A.
W74-09845

ENVIRONMENTAL MONITORING REPORT OF THE LACROSSE BOILING WATER REACTOR (WISCONSIN) FROM JANUARY 1, 1971 TO DECEMBER 31, 1972.
Dairyland Power, Cooperative, LaCrosse, Wis.
For primary bibliographic entry see Field 5A.
W74-09846

ENVIRONMENTAL MONITORING REPORT FOR CALENDAR YEAR 1972 FOR THE NATIONAL ACCELERATOR LABORATORY, BATAVIA, ILLINOIS,
National Accelerator Lab., Batavia, Ill.
For primary bibliographic entry see Field 5A.
W74-09847

1972 NATIONAL REACTOR TESTING STATION ENVIRONMENTAL MONITORING PROGRAM REPORT, (IDAHO FALLS, IDAHO).
Idaho Operations Office (AEC), Idaho Falls. Health Services Lab.
For primary bibliographic entry see Field 5A.
W74-09848

EFFLUENT AND ENVIRONMENTAL MONITORING REPORT FOR CALENDAR YEAR 1972 FOR THE BETTIS ATOMIC POWER LABORATORY, (PITTSBURGH, PENNSYLVANIA).
Bettis Atomic Power Lab., Pittsburgh, Pa.
For primary bibliographic entry see Field 5A.
W74-09849

KNOLLS ATOMIC POWER LABORATORY (SCHENECTADY, NEW YORK) ANNUAL ENVIRONMENTAL MONITORING REPORT CALENDAR YEAR 1972.
Knolls Atomic Power Lab., Schenectady, N.Y.
For primary bibliographic entry see Field 5A.
W74-09850

ANNUAL EFFLUENT DATA AND ENVIRONMENTAL MONITORING REPORT OF THE SHIPPINGPORT ATOMIC POWER STATION, (PENNSYLVANIA).
Duquesne Light Co., Shippingport, Pa.
For primary bibliographic entry see Field 5A.
W74-09851

ENVIRONMENTAL MONITORING REPORT FOR THE NEVADA TEST SITE AND OTHER TEST AREAS USED FOR UNDERGROUND NUCLEAR DETONATIONS - JANUARY-DECEMBER 1972.
National Environmental Research Center, Las Vegas, Nev.

For primary bibliographic entry see Field 5A.
W74-09852

FEED MATERIALS PRODUCTION CENTER (CINCINNATI, OHIO) ENVIRONMENTAL MONITORING ANNUAL REPORT FOR 1972.
National Lead Co. of Ohio, Cincinnati.
For primary bibliographic entry see Field 5A.
W74-09853

ENVIRONMENTAL MONITORING REPORT - UNITED STATES ATOMIC ENERGY COMMISSION - OAK RIDGE FACILITIES, CALENDAR YEAR 1972.
Oak Ridge Gaseous Diffusion Plant, Tenn.
For primary bibliographic entry see Field 5A.
W74-09854

ENVIRONMENTAL MONITORING REPORT - UNITED STATES ATOMIC ENERGY COMMISSION - PADUCAH GASEOUS DIFFUSION PLANT (KENTUCKY) - CALENDAR YEAR 1972.
Paducah Gaseous Diffusion Plant, Ky.
For primary bibliographic entry see Field 5A.
W74-09855

PORTSMOUTH GASEOUS DIFFUSION PLANT (OHIO) ENVIRONMENTAL MONITORING REPORT - 1972,
Goodyear Atomic Corp., Piketon, Ohio.
For primary bibliographic entry see Field 5A.
W74-09856

ANNUAL ENVIRONMENTAL MONITORING REPORT 1972 - LAWRENCE BERKELEY LABORATORY, (CALIFORNIA),
California Univ., Berkeley. Lawrence Berkeley Lab.
For primary bibliographic entry see Field 5A.
W74-09857

ANNUAL ENVIRONMENTAL MONITORING REPORT OF STANFORD LINEAR ACCELERATOR CENTER (CALIFORNIA) - JANUARY-DECEMBER 1972,
Stanford Linear Accelerator Center, Calif.
For primary bibliographic entry see Field 5A.
W74-09858

ENVIRONMENTAL MONITORING IN THE VICINITY OF THE SAVANNAH RIVER PLANT (SOUTH CAROLINA) - ANNUAL REPORT FOR 1972.
Du Pont de Nemours (E.I.) and Co., Aiken, S. C.
For primary bibliographic entry see Field 5A.
W74-09859

WATER MOTION AND WATER-SEDIMENT INTERACTION,
Scripps Institution of Oceanography, La Jolla, Calif.
D. Inman, D. Swift, D. Duane, J. Smith, and G. Gross.
In: Offshore Nuclear Power Siting Workshop, Report No WASH-1280, p 1-15, (1973). 38 ref.

Descriptors: *Nuclear powerplants, *Sites, *Offshore platforms, Movement, Water pollution, *Sediments, Nuclear reactors, Effluents, Oceans, Meteorology, Topography, Structural stability, Oceanography, Sediment transport, Path of pollutants, Radioactivity, Discharge(Water), Food chains, Public health, Breakwaters, Basins.

Discussed are problems concerned with water motion and the water-sediment interactions that occur over the continental shelf and are thought to be important to environmental considerations of the contemplated offshore power systems, their effluents, and their protective structures. The important processes that operate in the nearshore water of all oceans appear to be similar in kind. They differ mainly in intensity and scale, variables which are determined by the energy in the driving forces such as winds and currents, and by the physical dimensions and topography of the nearshore zone. With these concepts in mind, the general approach was to identify the important processes, and their likely interactions with the proposed structures and effluents. Where possible, the present state of understanding and the availability of data are indicated. Each item requiring additional research is categorized. The processes and interactions were discussed under four major headings: (A) Physical Oceanography; (B) Water-Sediment Interface and Sediment Transport Paths; (C) Power Plant Intake and Discharge; and (D) Detached Breakwater and Basin. (See also W74-09862) (Houser-ORNL)
W74-09863

BIOLOGICAL ASPECTS OF OFFSHORE NUCLEAR POWER PLANTS,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5C.
W74-09864

FALLOUT PROGRAM--QUARTERLY SUMMARY REPORT, SEPTEMBER 1, 1973, THROUGH DECEMBER 1, 1973,
Health and Safety Lab. (AEC), New York.
For primary bibliographic entry see Field 5A.
W74-09869

FALLOUT PROGRAM--QUARTERLY SUMMARY REPORT--JANUARY 1, 1973, THROUGH DECEMBER 1, 1973, APPENDIX,
Health and Safety Lab. (AEC), New York.
For primary bibliographic entry see Field 5A.
W74-09870

POSSIBLE EFFECTS OF IONIZING RADIATION UPON MARINE LIFE AND SOME IMPLICATIONS OF POSTULATED ACCIDENTAL RELEASES OF RADIOACTIVITY,
California Univ., Los Angeles. Office of Environmental Science and Engineering.
For primary bibliographic entry see Field 5C.
W74-09871

POPULATION DOSES FROM THE NUCLEAR INDUSTRY TO 2000 A.D.
For primary bibliographic entry see Field 5C.
W74-09872

RADIOACTIVE FALLOUT IN AIR AND RAIN: RESULTS TO THE MIDDLE OF 1973,
Atomic Energy Research Establishment, Harwell (England).
R. S. Cambray, E. M. R. Fisher, A. Parker, and D. H. Peirson.
Available from NTIS, Springfield, Va., as Rept No AERE-R-7540. Report No AERE-R-7540, December 1973. 45 p, 7 fig, 30 tab, 33 ref.

Descriptors: *Radioactivity, *Fallout, *Monitoring, Radioisotopes, Cesium, Strontium, Air pollution, Water pollution, Water pollution sources, Nuclear explosions, Sampling, Environment, Environmental effects, Rain, Rainfall deposition, Assay, Assessment, Toxicity, Public health, Forecast.
Identifiers: *United Kingdom, China, France, Worldwide deposition.

Samples of atmospheric dust and rainwater have been collected from the United Kingdom and elsewhere. Results are presented of analyses of these samples for various fission products and certain other radionuclides. The average concentrations of the long-lived fission products caesium-137 and strontium-90 were, in the first six months of 1973, less than half those for the first six months of 1972 and less than 2% of the maximum which was reached in 1963/64. Fresh activity from the yield Chinese explosion of 27 June 1973 was detected in the United Kingdom in July. The low yield French test series of July and August 1973 has had negligible effect upon the levels of long-lived fission products near the ground. An estimate is made of the worldwide deposit of Cs-137 and Sr-90 in rain to the end of 1972; the cumulative deposit has remained substantially constant since 1966. About three-quarters of the total long-lived activity has been deposited in the northern hemisphere. The gamma and beta-ray dose rates in air from fallout at Chilton are estimated from the observed deposition. (Houser-ORNL)
W74-09876

INVESTIGATION AND EVALUATION OF 102-BX TANK LEAK,
Atlantic Richfield Hanford Co., Richland, Wash. Engineering Dept.
J. C. Womack, and D. J. Larkin.
Available from NTIS, Springfield, Va., as Rept No ARH-2035; $4/copy, $1.45/microfiche. Report No ARH-2035, March 1971. 18 p, 5 fig, 2 tab, 8 ref.

Descriptors: *Radioactive waste disposal, *Monitoring, *Waste storage, *Leakage, Radioactivity, Cesium, Assay, Assessment, Safety, Evaluation, Soil contamination, Water pollution, Groundwater, Hazard, Public health, Standards, Regulation, Ion transport, Movement.
Identifiers: *Storage container.

Since 1943, 151 waste tanks located in 13 tank farms have been constructed at Hanford. To date, leaks have been confirmed in eleven tanks located in four of the farms, and six other tanks are suspected leakers. Inventory data from the suspect tanks indicated relatively small losses of liquid waste, and in some cases radioactivity had been noted in adjacent monitoring wells. All suspect as well as leaking tanks have been removed from service. One of these suspected leaking tanks is 241-BX-102. Findings are reported of a field investigation to determine if radioactive wastes had indeed leaked from this tank, and if so, estimate the volume lost and extent of waste liquid movement through the soil. Based on analyses of liquid level history, test well radiation profiles and soil sampling and analyses, tank 102-BX has been confirmed as a leaker. The most probable explanation of the tank 102-BX leak is given. (Houser-ORNL)
W74-09877

RADIOLOGICAL MONITORING PROGRAM-PERIOD COVERING MAY 17, 1973, THRU JULY 31, 1973, FOR CER GEONUCLEAR COR PORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Sante Fe, N.Mex. Santa Fe Lab.
Available from NTIS, Springfield, Va., as Rep No PNE-RB-51-6; $4/copy, $1.45/microfiche. Report No PNE-RB-51-6, 1973. 21 p, 14 tab, 3 ref.

Descriptors: *Nuclear explosions, *Secondar recovery(Oil), *Natural gas, *Radioactivity *Surveys, Assay, Air pollution, Water pollution Environmental effects, Radioactivity effect Background radiation, Tritium, Food chain Public health.
Identifiers: Stimulation, Beta radioactivity Gamma radioactivity.

Beta radioactivity in air particulate samples f May 17, 1973 through July 31, 1973 remained very low concentrations, ranging from 0.01 to 0. pCi/m(3). These values are consistent with valu observed and reported by the Environmental Pr tection Agency (EPA) Air Surveillance Netwo and are no higher than for previous period Gamma scans of the air particulate sampl

(composite) indicated that the concentrations of gamma emitters were below the minimum sensitivity of the 4-in. diameter times 4-in. thick NaI(Tl) detector. TLD data for this period indicated an average background radiation dose rate of 2.8 millirem per week. This is consistent with the dose rate measured in 1972. Beta radioactivity in surface water ranged from 0.0 to 8.3 pCi/l. These results were in agreement with other data obtained by Eberline. Tritium concentrations were less than 1.0 pCi/ml, concentrations measured by electrolytic enrichment being in the range of 0.1 to 0.6 pCi/l. Gamma scans indicated no detectable activity above background and system sensitivity. Gamma isotopic (GeLi) analysis of milk indicated no significant concentration of gamma emitters except natural K-40. (Houser-ORNL)
W74-09878

INVESTIGATION OF SOME FACTORS IN THE BIOCHEMICAL CONVERSION OF HG POLLUTANTS TO TOXIC METHYL HG EFFECTED BY MICROORGANISMS IN A MARINE SEDIMENT,
Naval Academy, Annapolis, Md.
M. McKinney.
Available from NTIS, Springfield, Va., as AD-749 674; $5.45 in paper copy, $0.95 in microfiche. Report USNA-TSPR-32, May 1972. 89 p, 157 ref.

Descriptors: *Mercury, *Reviews, *Environmental effects, *Estuarine environment, *Bibliographies, Food chains, Public health, Path of pollutants, Sediments, Analytical techniques, Aquaria, Physichemical properties, Bacteria, Training.

The literature on environmental Hg is reviewed, and aquaria experiments conducted to study the conversion of inorganic Hg in sediments to methyl Hg are described. Methyl Hg produced in sediment was loosely bound and was dispersed into the water by stirring the water in the aquarium. Methyl Hg was determined by gas chromatography, with a sensitivity of 50 ng/g sediment. (Bopp-ORNL)
W74-09879

RADIOACTIVE WASTE MANAGEMENT INFORMATION: 1972 SUMMARY AND RECORD-TO-DATE.
Idaho Operations Office (AEC), Idaho Falls.
Available from NTIS, Springfield, Va., as Rept No IDO-10054; $3.25/copy, $1.45/microfiche. Report No IDO-10054, 1972. 21p.

Descriptors: *Monitoring, *Radioactive waste disposal, *Idaho, *Radioisotopes, Waste treatment, Waste storage, Transportation, Administrative agencies, Nuclear reactors, Effluents, Water pollution, Data collections.
Identifiers: National Reactor Testing Station(Idaho).

Radioactive waste records associated with activities at the National Reactor Testing Station for 1972 are summarized. Summary data since 1952 are included. The volumes, radioactivity, isotopic identity, origin of waste, and decay data are given. The waste data have been taken from the NRTS Waste Management Information System. The record-to-date information has been previously reported in various documents. This information has been condensed and presented herein as a comprehensive summary of the radioactive wastes discharged to the environment from operations performed at the NRTS. In the review of the data prior to 1970, several apparent discrepancies were satisfactorily resolved. Also, recent declassification of some data permitted updating of past years' discharges. (Houser-ORNL)
W74-09880

MODELING FLOW AND CHEMICAL QUALITY CHANGES IN AN IRRIGATED STREAM-AQUIFER SYSTEM,
Geological Survey, Lakewood, Colo.
L. F. Konikow, and J. D. Bredehoeft.
Water Resources Research, Vol 10, No 3, p 546-562, June 1974. 25 fig, 3 tab, 30 ref.

Descriptors: *Water quality, *Groundwater movement, *Path of pollutants, *Return flow, *Numerical analysis, Surface-groundwater relationships, Unsteady flow, Mathematical models, Alluvial channels, Dissolved solids, Conjunctive use, *Colorado.
Identifiers: *Arkansas River(Colo).

Salinity increases in groundwater and surface water in the Arkansas River valley of southeastern Colorado are primarily related to irrigation practices. A digital computer model was developed to predict changes in dissolved solid concentration in response to spatially and temporally varying hydrologic stresses. The equations that describe the transient flow of groundwater and the transport and dispersion of dissolved chemical constituents were solved numerically. The model simulated flow as well as changes in water quality for both the stream and the aquifer. Detailed field measurements made for a 1-yr period in an 11-mi reach of the valley between La Junta and the Bent-Otero county line were used to verify and calibrate the model. Measured water levels varied by an average of about 3 ft during the study period, and calculated water table elevations in the aquifer were within 1 ft of the observed values approximately 90% of the time. The specific conductances of water samples from five wells in one well field had a standard deviation of about 10% of the mean. Dissolved solid concentrations calculated by the model were within 10% of the observed values for both the aquifer and the stream approximately 80% of the time. (Knapp-USGS)
W74-09883

OCCURRENCE OF DISSOLVED ORGANIC CARBON IN SELECTED GROUND-WATER SAMPLES IN THE UNITED STATES,
Geological Survey, Denver, Colo.
J. A. Leenheer, R. L. Malcolm, P. W. McKinley, and L. A. Eccles.
Journal of Research of the U S Geological Survey, Vol 2, No 3, p 361-369, May-June 1974. 3 tab, 4 ref.

Descriptors: *Organic matter, *Groundwater, Water quality, Water chemistry, Sampling, Water analysis, Chemical analysis, Alkalinity, Aquifer characteristics.
Identifiers: Dissolved organic carbon.

Nonvolatile DOC (dissolved organic carbon) in groundwater was studied to establish base levels of naturally occurring dissolved organic materials. Samples of groundwater were obtained at 100 sites in 27 states. Samples were pressure filtered at the time of collection and immediately frozen on dry ice. DOC concentrations were determined by wet oxidation of organic carbon to carbon dioxide which was measured by an infrared analyzer. The DOC concentrations ranged from less than the 0.1 mg/liter limit of detection to 15 mg/liter. Concentrations of DOC were directly correlated with specific conductance and alkalinity, but did not correlate with pH. The DOC mean concentration was 1.2 mg/liter; however, the DOC median value was lower at 0.7 mg/liter. Differences in DOC concentrations for various types of consolidated rock aquifers were slight; for example, median DOC values for sandstone, limestone, and crystalline rock aquifer types ranged from 0.5 to 0.7 mg/liter. No difference was found in the median DOC concentration between shallow (less than 200 ft; 61 m) and deep (greater than 200 ft) sand and gravel aquifers. (Knapp-USGS)
W74-09917

HEAT TRANSFER MODELS FOR A SUBSURFACE, WATER PIPE, SOIL-WARMING SYSTEM,
Arkansas Univ., Fayetteville. Dept. of Chemical Engineering.
J. H. Kendrick, and J. A. Havens.
Journal of Environmental Quality, Vol 2, No 2, p 188-196, April-June 1973. 12 fig, 6 tab. OWRR A-014-ARK (1).

Descriptors: *Recycling, *Thermal pollution, *Heat transfer, *Soils, Heat flow, Mathematical models, Water pollution control, Pollution abatement, Cooling water, Powerplants.
Identifiers: Waste heat, Soil heating.

Mathematical models are presented for the prediction of heat losses from subsurface pipes carrying hot water. The method of images is used to calculate the heat loss from a hot water pipe buried at a given depth below the surface of a homogeneous soil with a constant soil surface temperature. The heat loss is described as a function of the difference between the temperature of the soil surface. The energy balance is used to determine the longitudinal temperature distribution of the water. The method is extended to describe the heat loss and the longitudinal temperature distribution for a system of equally spaced, parallel, subsurface pipes with water flowing in the same direction in neighboring pipes. The method is extended to calculate the heat loss and the longitudinal temperature distribution for a system of equally spaced, parallel, subsurface pipes with water flowing in opposite directions in neighboring pipes. Soil temperature profiles around the buried pipes are calculated. The models may be used to calculate the land area which can be heated with an underground piping system carrying the cooling water from the condensers of a 1000-megawatt nuclear-powered steam generation electric power plant. (Knapp-USGS)
W74-09921

SIMULATION MODEL TO STUDY THE UTILIZATION OF WASTE HEAT USING A COMBINATION MULTIPLE RESERVOIR AND GREENHOUSE COMPLEX,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-09925

GROUND WATER POLLUTION FROM SUBSURFACE EXCAVATIONS: PART IV. MORE ON POLLUTION FROM WELLS.
Water Well Journal, Vol 28, No 7, p 51-54, July 1974. 1 tab.

Descriptors: *Waste disposal wells, *Water pollution sources, *Injection wells, Monitoring, Water pollution control, Path of pollutants, Aquifer characteristics, Waste water disposal.

A foremost consideration in evaluating the feasibility of waste injection is the character of the waste. The suitability of waste for subsurface injection depends on its volume and physical and chemical properties of the potential injection zones and their interstitial fluids. Optimal use of underground storage space will be realized by use of well injection only where (1) more satisfactory alternative methods of waste treatment and disposal are not available, and (2) minimization of injected-waste volumes is achieved through good waste management. Knowledge of the mineralogy of the aquifer and the chemistry of interstitial fluids and waste should indicate the reactions to be anticipated during injection. Common minerals that react significantly with wastes are the acid soluble carbonate minerals and the clay minerals. Well-head pressure and waste injection rate should be continuously measured. If injection tubing is used, the casing-tubing annulus should be pressure monitored. Other types of monitoring include measurement of the physical, chemical, and

biological character of injected fluids on a periodic or continuous basis, and periodic checking of the casing and tubing for corrosion, scaling, or other defects. Changes in the quality of water in springs, water supply wells, streams and lakes may also be monitored to detect effects from waste disposal wells. (Knapp-USGS)
W74-09929

MEASUREMENT AND MANAGEMENT ASPECTS OF WATER TOXICOLOGY: THE MALIBU WATERSHED A MIXED RESIDENTIAL AND WILDNESS AREA,
California Univ., Los Angeles. School of Public Health.
E. S. Flowers.
Available from the National Technical Information Service as PB-233 926 $3.75 in paper copy, $1.45 in microfiche. Completion Report, May 1974, California Water Resources Center, Davis. 48 p, 9 fig, 11 tab, 11 ref, (Univ. of Calif. Water Resources Center Project UCAL-WRC-W-330). OWRR-A-038-CAL (3).

Descriptors: *Watershed management, *Water quality, *California, Watersheds(Basins), *Baseline data, Evaluation, Planning, *Toxicity, Measurement, Data collections.
Identifiers: *Malibu watershed(Calif), *Residential-wilderness areas.

The Malibu Watershed was selected as a particularly suitable area for the study of toxic substances and their possible influences on water quality and beneficial uses of the region. The collection of data on water quality, vegetation, possible environmental interactions occurring between wilderness and residential areas, land use and general geographical characteristics of the Malibu Creek drainage area has been useful in providing opportunities for training of students in evaluation and planning aspects of water quality, while the information developed in the project has provided baseline data for future studies. The objectives were to determine water quality in the Malibu Watershed, to evaluate possible influences resulting from the introduction or removal of toxic substances, and to provide training in watershed management, planning, and protection. (Snyder-California, Davis)
W74-09950

LAKE MICHIGAN,
For primary bibliographic entry see Field 5C.
W74-09953

LAKE ERIE,
For primary bibliographic entry see Field 5C.
W74-09954

PUGET SOUND,
For primary bibliographic entry see Field 5C.
W74-09955

SAN FRANCISCO BAY,
For primary bibliographic entry see Field 5C.
W74-09956

LONG ISLAND SOUND,
For primary bibliographic entry see Field 5C.
W74-09957

HUDSON RIVER,
For primary bibliographic entry see Field 5C.
W74-09958

THE LOWER MISSISSIPPI,
For primary bibliographic entry see Field 5C.
W74-09959

SAVANNAH RIVER,
For primary bibliographic entry see Field 5C.
W74-09960

THE EFFECTS OF INCREASED PRODUCTION ON THE OCEANS,
For primary bibliographic entry see Field 5C.
W74-09963

SUMMARY OF FINDINGS CONCERNING WATER,
For primary bibliographic entry see Field 5C.
W74-09964

SANITARY LANDFILL,
Army Construction Engineering Research Lab., Champaign, Ill.
For primary bibliographic entry see Field 5E.
W74-10018

DEVELOPMENT OF A MONITOR FOR RECYCLE OF WASTE WATER,
Amicon Corp., Lexington, Mass.
For primary bibliographic entry see Field 5D.
W74-10037

THE PUDSEY PROJECT,
For primary bibliographic entry see Field 5D.
W74-10041

THE EFFECT OF A CHEMICAL METHOD FOR GAUGING DISCHARGE ON THE INVERTEBRATES OF A MOUNTAIN RIVER, (IN FRENCH),
Paul Sabatier Univ., Toulouse (France). Lab. of Hydrobiology.
For primary bibliographic entry see Field 7B.
W74-10048

SAVING A DYING SEA. THE LONDON CONVENTION ON OCEAN DUMPING,
For primary bibliographic entry see Field 6E.
W74-10065

ACQUISITION OF INFORMATION FROM OWNERS AND OPERATORS OF POINT SOURCES SUBJECT TO NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10069

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM--PROPOSED FORMS AND GUIDELINES ACQUISITION OF INFORMATION FROM OWNERS AND OPERATORS OF POINT SOURCES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10073

CONCENTRATION AND DISTRIBUTION OF TRACE ELEMENTS IN THE MAUMEE RIVER BASIN, OHIO, INDIANA AND MICHIGAN,
Ohio State Univ., Columbus. Dept. of Geology and Mineralogy.
W. A. Pettyjohn, L. R. Hayes, and T. R. Schultz.
Available from the National Technical Information Service as PB-234 013, $5.75 in paper copy, $1.45 in microfiche. Ohio Water Resources Center, Columbus, Completion Report No 396X, March 1974. 176p, 67 fig, 16 tab, 106 ref, 2 append. OWRR A-026-OHIO(1).

Descriptors: Trace elements, *Sediments, Water quality, *Heavy metals, Water supply, *Ohio, Michigan, Indiana, Aluminum, Arsenic, Cadmium, Cobalt, Chromium, Copper, Mercury, Nickel, Lead, Strontium, Zinc, *Distribution, *Path of pollutants, *Spectrophotometry, *Pollutant identification, Water pollution sources.
Identifiers: Silver, Tin, *Maumee River basin(Ohio-Mich-Ind), Atomic absorption spectrophotometry.

During the period 1971-1973, water and stream-bottom sediment samples were collected from 225 sites distributed throughout the Maumee River Basin, which lies largely in Ohio. The samples were examined by atomic absorption methods in order to determine concentrations of Ag, Al, Cd, Co, Cr, Cu, Hg, Ni, Pb, Sn, Sr, and Zn. The concentration of these elements in both water and sediment included a wide range, but in most cases the concentrations in water are very small while in sediment they may be very large. Seven municipalities in the basin are characterized by large concentrations of one or more elements in water or sediment, probably resulting from industrial and municipal waste disposal. A large number of samples from small streams in rural areas contained high concentrations of As, Hg, Pb, Ni, and Zn. These may be related to natural causes and the agricultural use of pesticides. Some high concentrations, such as As, Hg, and Sn, may be more apparent than real due to instrument error and analytical techniques.
W74-10084

WATER IS WHERE YOU FIND IT,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 8B.
W74-10094

ENVIRONMENTAL RADIOACTIVITY ANNUAL REPORT, 1972.
National Radiation Lab., Cristchurch, (New Zealand).
For primary bibliographic entry see Field 5A.
W74-10112

RETENTION OF RADIONUCLIDES DEPOSITED IN THE CHALK RIVER NUCLEAR LABORATORIES WASTE MANAGEMENT AREAS,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
W. F. Merritt, and C. A. Mawson.
Available from Atomic Energy of Canada, Ltd., Chalk River, Ontario, as Rept. No. AECL-4510; $0.50/copy. Atomic Energy of Canada Limited, Report No. AECL-4510, September 1973. 7 p, 3 fig, 1 tab, 7 ref.

Descriptors: *Radioactive waste disposal, *Sites, *Groundwater movement, Baseflow, *Water pollution, *Retention, Climatology, Streams, Soil contamination, Ion exchange, Water table, *Canada.
Identifiers: Perch Creek, Ottawa River, Waste management.

Records are presented of the amounts of radionuclides deposited in engineered enclosures and directly into the ground in the waste management areas of the Chalk River Nuclear Laboratories up to the end of 1972. About 5.2 MCi of long-lived radionuclides, mainly in the form of stored reactor fuel, have been placed in engineered facilities and about 32 kCi have been deposited directly into the ground. Any radionuclides escaping into public waters from this system must pass down Perch Creek into the Ottawa River. The total run-off down Perch Creek over the whole period was 13 Ci. The Chalk River site has therefore proved to be very effective in retaining radionuclides in spite of the low ion-exchange capacity of the soil and conditions of climate and water table height that make it less than ideal for radioactive waste management. (Houser-ORNL)
W74-10119

PERCOL USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resource Dept.
R. J. Serne, and R. C. Routson.
Available from NTIS, Springfield, Va., as Rept. No. BNWL-1720; $5.45/copy, $1.45 microfiche. Report No. BNWL-1720, 1973. 75 p, 1 fig, 6 ref, 3 append.

Descriptors: *Model studies, *Radioactive waste disposal, Effluents, *Leakage, *Soil contamination, *Water pollution, Path of pollutants, Radioisotopes, Movement, Ion transport, Transfer, Ion exchange, Computer program, *Washington.
Identifiers: Hanford Site(Wash).

Research being conducted under the Radionuclides in Soils Program is attempting to predict the distribution and movement of liquid wastes in the heterogeneous subsurface environment of the Hanford Reservation. As part of this program, a transport model is being developed to predict chemical phenomena in soil-waste reactions. This document describes the use of the PERCOL model, which was developed as a simplified one-dimensional precursor to the transport model. PERCOL numerically describes the complex chemical reactions which occur during percolation of a waste solution through a porous media. This User's Manual describes the main program (PERCOL) and two subroutines (NEWTIT and DIST) and gives procedures for accessing these programs, inputting data to them and interpreting the output. (Houser-ORNL)
W74-10123

FAILURE OF 307 BASIN TRANSFER LINE AND RESULTANT GROUND CONTAMINATION,
Battelle-Pacific Northwest Lab., Richland, Wash.
D. H. Dehnam.
Available from NTIS, Springfield, Va., as Rept No BNWL-CC-2617; $4/copy, $1.45/microfiche. Report No BNWL-CC-2617, 1970. 26 p, 7 fig, 2 tab, 4 ref, 2 append.

Descriptors: *Leakage, *Strontium, *Cesium, *Underground waste disposal, *Corrosion, *Pipelines, Soil contamination, Water pollution, Accidents, Hazards, Safety, Evaluation, Assessment, Monitoring, Radioactivity, *Washington.
Identifiers: *Hanford Site(Wash).

Approximately 900 curies of relatively short-lived radionuclides, including 10 curies each of Sr-90 and Cs-137 inadvertently leaked to the soil as a result of the corrosion of an undergound carbon steel pipe section. Greater than 90% of the contamination from this incident is confined within a cylindrical section of earth approximately 25 feet deep and 12 feet in diameter. Despite the fact that promethium and cerium were combined with complexing agents, both were substantially retained by the soil. Any groundwater contamination from this incident was minimal, because no 300 Area groundwater samples showed detectable concentrations of the nuclides found in the soil. Since the leak existed for some time (longer than a year), any further migration of the activity from its sorbed position in the soil should be negligible. (Houser-ORNL)
W74-10127

AMMONIA VOLATILIZATION AND NITROGEN TRANSFORMATIONS IN HIGH PH SOILS USED FOR BEEF MANURE DISPOSAL,
Corps of Engineers, Vicksburg, Miss.
R. E. Peters, and D. L. Reddell.
Paper No 73-428, presented at the Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973, 31 p, 8 fig, 9 tab, 24 ref.

Descriptors: *Ammonia, *Volatility, *Hydrogen ion concentration, Nitrogen, *Soils, *Sampling, Denitrification, *Farm wastes, Cattle, Feed lots, Carbon dioxide, Lime, Chemical properties, Fertilizers, *Texas.
Identifiers: *Nitrogen transformations, Tabor loamy fine sand, Carbonates.

Eighteen soil columns were used to study ammonia volatilization and nitrogen transformations in soils receiving manure applications. Three of both limed (pH=12.0) and unlimed (pH=7.5) soil columns were evaluated after 30, 60, and 90 days treatments. More NH3 was evolved from the limed soils than from the unlimed soils. CO2 production was greater in unlimed soils. Final chemical analasis of soils revealed 10% and 20% losses in nitrogen from limed and unlimed soils respectively. These nitrogen losses were greater in the upper 30 cm. of the soil columns. Nitrogen losses from the limed columns were believed to be by nitrification and then denitrification. (Frantz-East Central)
W74-10143

THE PERFORMANCE OF PRIMARY SETTLING ON LIVESTOCK FEEDLOT RUNOFF,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10146

QUALITY DEGRADATION OF DAIRY WASHWATER,
California Univ., Riverside.
A. C. Chan, G. Yamashita, J. B. Johanson, K. Aref, and D. C. Baier.
Paper No 73-440 presented at the Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973, 21 p, 5 fig, 5 tab.

Descriptors: *Quality control, *Degradation(Decomposition), *Dairy industry, *Groundwater pollution, *Farm wastes, Cattle, Waste disposal, Effluent, Chemical properties, Physical properties, Nitrogen, Salts, Chemical oxygen demand, Waste water(Pollution), Return flow, *California.

Representative samples from twenty-five dairies, divided into five groups according to size, were evaluated for quality degradation of dairy washwater. The water supply was totally dependent upon the underground source. The physical and chemical properties of wastewater were compared with those of the water used before washing. The greatest increase was in chemical oxygen demand, total nitrogen and total dissolved salts. The increment was at least 4-5 times higher than that in water used for domestic purposes. Removal of nitrogen and dissolved salts is the major concern for making water suitable for land disposal. (Frantz-East Central)
W74-10147

ON THE COMBINED TREATMENT OF DOMESTIC SEWAGE AND WASTE WATER FROM WOOD INDUSTRIES,
Oulu Univ. (Finland).
For primary bibliographic entry see Field 5D.
W74-10173

ODORS FROM CONFINED LIVESTOCK PRODUCTION,
Oregon State Univ., Corvallis. Dept. of Agricultural Engineering.
J. R. Miner.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-023, $1.70; microfiche from NTIS as PB-234 182 $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-74-023, April 1974. 125 p, 6 fig, 33 tab, 88 ref, 2 append. EPA 1BB039.

Descriptors: *Odor, *Livestock, *Legal aspects, Cattle, Hogs, Poultry, Hydrogen sulfide, Ammonia, *Farm wastes, *Organoleptic properties, Waste treatment.
Identifiers: *Olfaction, *Ammonia desorption, *Livestock manure, Odor control.

Current livestock production techniques result in the generation of odors which have become a source of conflict between livestock producers and society. The odorous gases responsible for the nuisance are principally low molecular weight compounds released during anaerobic decomposition of manure. Manure management systems which control or modify this decomposition offer the greatest potential for odor control. Research to identify the chemical compounds present in odorous air from animal waste degradation has yielded about 45 compounds to date. The amines, mercaptans, organic acids and heterocyclic nitrogen compounds are generally regarded as being of greatest importance. Among the techniques for odor control are: (a) site selection away from populated areas and where adequate drainage exists, (b) maintain the animal areas as dry as possible and prevent the animals from becoming manure covered, (c) select manure handling systems which utilize aerobic environments for manure storage, (d) maintain an orderly operation free of accumulated manure and runoff water, (e) practice prompt disposal of dead animals and (f) use odor control chemicals when short term odor control is necessary, such as when manure storage tank contents must be field spread. (EPA)
W74-10188

NEW MICROBIAL INDICATORS OF WASTEWATER CHLORINATION EFFICIENCY,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10189

SOURCES OF OIL AND WATER IN BILGES OF GREAT LAKES SHIPS,
Michigan Univ., Ann Arbor. Dept. of Naval Architecture and Marine Engineering.
J. B. Woodward.
Copy Available from GPO Sup Doc as EP1.23:670/2-74-054, $0.85; from NTIS as PB-233 846, $3.25 in paper copy, microfiche $1.45. Environmental Protection Agency, Cincinnati, Ohio, Technology Series Report EPA-670/2-74-054, July 1974. 33 p, 2 fig, 5 tab, append. EPA R802475.

Descriptors: *Water pollution sources, Water analysis, *Ships, Turbines, *Oil wastes, *Great Lakes, Steam turbines.
Identifiers: *Bilge water, Diesel engines(Ships), Reciprocating engines, Ship turbines.

Sources of bilge water and of oil in bilge water were surveyed aboard five ships of the Cleveland Cliffs Iron Company. The ships included two powered by steam turbines, one by a uniflow steam engine, one by a conventional reciprocating steam engine, and one by a diesel engine. It is found that many sources of bilge water are clean sources. Although no accurate estimate of the water thus contributed to the bilges can be offered, it is concluded that diverting these sources from the bilges could ease the task of separating, storing, and disposing of oil wastes. Several samples of water were taken from each ship, and analyzed for total, fixed and volatile non-filterable residue, color, pH, turbidity, total organic carbon, and oil and grease concentration. (EPA)
W74-10191

COMBINED SEWER OVERFLOW ABATEMENT PLAN, DES MOINES, IOWA,
Henningson, Durham and Richardson, Inc., Omaha, Nebr.
For primary bibliographic entry see Field 5D.
W74-10194

TURBULENT DIFFUSION IN LIQUID JETS: FINAL REPORT,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
S. C. Chaung, and V. W. Goldschmidt.
Copy Available from GPO Sup Doc as EP1.23:660/3-74-004b, $1.70; microfiche from NTIS as PB-234 171 $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-74-004b, March 1974. 126 p, 45 fig, 5 tab, 91 ref. EPA Project 16070 DEP.

Descriptors: Bubble, *Diffusion, Dispersion, Equations, Instrumentation, *Turbulence, *Turbulent flow, *Jets.
Identifiers: Bubble sampling, Bubble sizing, Concentration of contaminants, Hot film anemometer, Jet flow, Liquid jets, *Turbulent diffusion, *Turbulent transport.

Laboratory studies were conducted on the dispersion of gas droplets of different sizes in turbulent water jets. The main purpose was to determine the turbulent transport coefficient of contaminants suspended in turbulent flows. The experimental results were compared to measurements of diffusion of liquid droplets in air jets as well as to a numerical analysis based on the equations of the particles themselves. The results confirm that small particles in turbulent flows have an increasing turbulent transport coefficient with size. The collated experimental results exhibit when Reynolds analogy (in the transport of mass and momentum) can be validly employed. (See also W74-10196) (Ditsworth-EPA)
W74-10195

TURBULENT DIFFUSION IN LIQUID JETS: PART I, MEASUREMENT OF PARTICLE CONCENTRATION BY A LIGHT SCATTERING PROBE,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
C. H. Tinsley, W. S. Stevenson, and V. W. Goldschmidt.
Copy Available from GPO Sup Doc as EP1.23:660/3-74-004a, $1.15; microfiche from NTIS as PB-234 170 $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-74-004a, March 1974. 69 p, 28 fig, 2 tab, 29 ref. EPA Project 16070 DEP.

Descriptors: Equations, Instrumentation, *Particle size, Suspension, Turbulent flow, *Diffusion, *Jets, Turbulence.
Identifiers: Lasers, *Light scattering probe, Particle concentration, *Particle size measurement.

A technique for measuring particle concentrations in turbulent flows was investigated. This technique is the measurement of the light scattered from an incident beam by the solid contaminants present. The results show that for moderate concentrations the scattering system gives proportional increases in count to increases in particle concentration. The limitations of this system are the signal to noise ratio and the condition of singular scattering by the particles. Suggestions on refinements on the correlation technique used are made and observed phenomena which require further investigation are discussed. (See also W74-10195) (Ditsworth-EPA)
W74-10196

NEGATIVELY BUOYANT JETS IN A CROSS FLOW,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
J. L. Anderson, F. L. Parker, and B. A. Benedict.
Copy Available from GPO Sup Doc as EP1.23:660/2-73-012, $2.50; microfiche from NTIS as PB-234 177 $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-73-012, October 1973. 199 p, 92 fig, 6 tab, 42 ref, 8 append. EPA Project 16130 FDQ.

Descriptors: *Thermal pollution, Thermal powerplants, Density currents, Entrainment, *Jets, *Waste dilution, Diffusion, Model studies, Flow, *Hydraulic models.
Identifiers: Jet discharge, Near field, Jet trajectory, *Negative buoyant jets, Densimetric Froude number.

Modification of Fan's and Abrahams jet diffusion models were used to predict the trajectory and dilution of a negatively buoyant jet. Such jets can occur when a chemical waste is discharged into a less dense ambient water or when cool, hypolimnetic water is used for condenser cooling water and discharged into less dense surface waters, then a sinking jet would result. Experimental investigations were conducted involving different combinations of densimetric Froude number, velocity ratio, and initial angle of discharge. Salt was used as the tracer, yielding a fluid that was denser than the ambient receiving water and facilitated measuring concentration profiles of the jet plume. The experimental data was then fitted with predicted jet dilution, trajectory, and cross sectional values for each model. The values of the entrainment coefficient were chosen as the one which best fit the experimental data for the particular combination of densimetric Froude number, velocity ratio, and initial angle of discharge. The value of the drag coefficient was chosen as zero for both models since any other value would predict a trajectory whose rise would be less than experimentally observed. Typically, for all angles of discharge the value of entrainment increased with a decrease in the velocity ratio and with an increase in densimetric Froude number. Additionally, there was a marked decrease in the entrainment coefficient with a decrease in the initial angle of discharge. (EPA)
W74-10200

APPLICATION OF POLARIZATION MEASUREMENTS IN TRACING TECHNIQUES,
Rhode Island Univ., Kingston.
R. Sierra.
Available from the National Technical Information Service as PB-234 143 $4.75 in paper copy, $1.45 in microfiche. M Sc Thesis, November 1973. 29 p, 2 fig, 4 graph, 4 tab, 7 ref. OWRR B-039-RI(2).

Descriptors: *Tracers, *Tracking techniques, Polarity, *Fluorescent dye, Fluorescence, Dye releases, Fluorometry, *Path of pollutants, *Pollutant identification.
Identifiers: *Polarization(Fluorescence).

A tracer with strongly polarized fluorescent output should be easily detected. The problem of tracing then is finding a region of zero or at least very small polarization in the background fluorescence. Laboratory applications could be made by careful calibration of the components involved. In field work where this calibration is not possible, it appears the technique may not be widely applicable. (Knapp-USGS)
W74-10203

ARTIFICIAL WEATHERING OF OXIDIZED BIOTITE: IV. THE INHIBITORY EFFECT OF POTASSIUM ON DISSOLUTION RATE,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nturition.
For primary bibliographic entry see Field 2G.
W74-10209

SOIL MOTTLING AND DRAINAGE IN A MOLLIC HAPLUDALF AS RELATED TO SUITABILITY FOR SEPTIC TANK CONSTRUCTION,
Wisconsin Univ., Madison. Coll. of Agricultural and Life Sciences.
M. J. Vepraskas, F. G. Baker, and J. Bouma.
Soil Science Society of America Proceedings, Vol 38, No 3, p 497-501, May-June 1974. 4 fig, 1 tab, 21 ref.

Descriptors: *Septic tanks, *Soil disposal fields, *Soil water movement, *Drainage, *Path of pollutants, Silts, Sands, Unsaturated flow, Oxidation, Reduction(Chemical), Hydraulic conductivity.

The feasibility of septic tank construction in a fine silty Mollic Hapludalf, with a mottled subsoil overlying permanently unsaturated sand, was investigated by measuring K values and soil drainage rates in situ. Mottles with chromas of 2 in the silty clay loam subsoil indicated reducing conditions. Channel and plane neoferrans indicated oxidative conditions in the larger pores. High K values and drainage rates occurred at saturation, due to channels and planes, but a very strong drop of these values occurred upon desaturation. Lack of extended saturation of the entire subsoil makes possible excavation of the silt cap and construction of a septic tank seepage bed in the underlying sand. (Knapp-USGS)
W74-10212

STUDY OF WATER QUALITY PREDICTION MODELS FOR USE IN ALABAMA,
Auburn Univ., Ala. Dept. of Civil Engineering.
J. M. Morgan, and B. A. Rindt.
Available from NTIS, Springfield, Va 22151 as PB-224 339 Price $3.25 printed copy; $1.45 microfiche. Alabama Development Office Report No ALA-AU-X996-WRC-72-b, February 1973. 18 p, 50 ref. WRC-72.

Descriptors: *Water quality, *Mathematical models, *Alabama, *Reviews, Surveys, Dissolved oxygen, Biochemical oxygen demand, Model studies, *Organic loading, *Forecasting.

The literature relating to stream water quality modeling was surveyed with the goal of selecting one or more such models that could be applied to Alabama rivers within a short time frame. Because organic loading and dissolved oxygen are the most important indicators of stream water quality, only models dealing with those parameters were considered. Given the restricted time frame required by the urgent need to develop comprehensive basin plans for Alabama's rivers and the severe lack of water quality data available, a steady-state, deterministic model originally developed for use on the upper Delaware River was most appropriate. (Knapp-USGS)
W74-10237

RECONNAISSANCE OF WATER QUALITY IN THE VICINITY OF SUNNILAND OIL FIELD, COLLIER COUNTY, FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
E. T. Wimberly.
Water-Resources Investigations 35-73, August 1973. 10 p, 1 fig, 2 tab, 12 ref.

Descriptors: *Oil fields, *Water pollution sources, *Florida, Water pollution effects, Path of pollutants, Gas chromatography, Gravimetric analysis, *Pollutant identification.
Identifiers: *Sunniland oil field(Fla).

The surface water in the area of the Sunniland oilfield, Florida was sampled and analyzed for chloride, organic carbon, oil and grease, and crude oil. Tests for chloride, organic carbon, and crude oil showed no contamination near the field. Oily substances were detected, by a gravimetric method of analysis, in the bottom sediment from the field and in the area surrounding the field in samples collected in February 1972. However, analysis by gas chromatography using flame ionization detector on the samples collected in July 1972 indicated no crude oil in samples of water or bottom sediment. Gravimetric method of analysis only reduced interference from indigenous materials; therefore, the oily substances detected in February 1972 may have come from natural sources or otherwise. In any case, the more refined method of analysis used on samples collected in July 1972 indicated no crude oil in the samples. (Knapp-USGS)

W74-10240

EFFECT OF ACIDITY ON REACTIONS OF ORGANIC ACIDS AND AMINES WITH MONTMORILLONITIC CLAY SURFACES,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
R. D. Harter, and J. L. Ahlrichs.
Soil Science Society of America Proceedings, Vol 33, No 6, p 859-863, November-December 1969. 5 fig, 18 ref.

Descriptors: Adsorption, *Organic acids, *Clay minerals, Pesticides, Organic compounds, Path of pollutants, Hydrogen ion concentration, Chemical potential, *Acidity, *Montmorillonite, Chemical reactions.
Identifiers: *Animes.

The effect of pH on the nature of 2,4-D, Amiben, aniline, and urea adsorbed by montmorillonite was studied using infrared spectra. In air dry systems, change of the compound to the acid or protonated form was found when the corresponding suspension pH was two to three pH units higher than the pK of the molecule. This is consistent with previous studies which indicated that the clay surface in air dry systems is more acid than shown by electrometric pH readings of the suspension. At pH levels below the pK the acids show evidence of adsorption by the clay. The amines acquire a positive charge and are capable of interacting with the clay exchange complex. Spectra of the aniline and urea adsorbed to acid clay were nearly identical to those of their hydrochlorides in the same environment, indicating reactions with the acid clay surfaces by protonated molecules. (Knapp-USGS)
W74-10244

FORMATION OF CLAY-PROTEIN COMPLEXES,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 2G.
W74-10245

A STUDY OF INCINERATOR RESIDUE ANALYSIS OF WATER SOLUBLE COMPONENTS,
Drexel Univ., Philadelphia, Pa. Environmental Engineering Program.
R. J. Schoenberger, and P. W. Purdom.
Available from NTIS, Springfield, Va 22151, PB-222 458, Price $7.00 printed copy; $1.45 microfiche. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-73-057, August 1973. 301 p, 46 fig, 55 tab, 58 ref, append. EPA Grant UI-00509.

Descriptors: *Waste treatment, *Pennsylvania, *Landfills, *Waste disposal, *Incineration, *Leaching, Solid wastes, Organic matter, Dissolved solids, Water pollution sources, Water pollution effects, Public health.
Identifiers: *Philadelphia(Penn).

Incinerator residue was studied in Philadelphia to establish procedural criteria for the rapid examination and evaluation of physical, chemical, and biological characteristics; to determine potential public health nuisance conditions resulting from placing incinerator residue in landfills with particular attention to rodent attraction and propagation, fly and insect breeding, odor emanations, wind and water erosion, and stream pollution; to determine the effect of the incenerator on the physical, chemical, and biological characteristics of residue; and to determine the maximum amount of leachable material in incinerator residue. The use of incinerator residue for landfilled site development is dependent on the length of time required for its chemical stabilization. Within 2 years 80-90 percent of the soluble material is removed by leaching. Optimization of leaching rate could enhance utilization of residue-filled sites for structural development. By proper sequencing of residue placement and spreading, maximum densities can be obtained without resorting to special compaction equipment. Hence, use of residue for development of landfill sites should not significantly increase disposal costs. Chemical components of the residue leachate are of interest when considering possible effects on concrete. The chlorides and nitrates of ammonia, magnesium, aluminum and iron attack concrete. The sulfates of calcium and sodium are also linked with degradation of concrete and these too are present in leachate. Most of the chemical problems can be eliminated by delay of construction until the residue has become chemically stable and by use of concrete protective coatings. (Knapp-USGS)
W74-10269

EFFECTS OF LANDFILL DISPOSAL OF CHEMICAL WASTES ON GROUNDWATER QUALITY,
Minnesota Univ., Minneapolis. School of Public Health.
P. K. Saint.
Available from Univ Microfilms, 300 No Zeeb Rd, Ann Arbor, Mich, 48106 (Order No 74-741). Phd Dissertion, 1973. 227 p.

Descriptors: *Landfills, *Groundwater, *Organic matters, *Metals, Salts, Laboratory tests, Chemical wastes, Bedrock, Aquifers, Flow, Microbiology, *Phenols, Biochemical oxygen demand, Water table, Toxicity, Soils, Mississippi River, Public health, Hydrogen ion concentration.

Public health and safety are threatened by disposal of toxic and hazardous wastes into landfills. In addition, soils and groundwater are contaminated. Predominant constituents are organic solvents like actone, alcohol and ether, and salts of metals, as seen in an inventory of chemical wastes generated by teaching and research laboratories at the University of Minnesota. Pits into which chemical wastes are disposed are located in an outwash sand plain, where the water table occurs at a depth of 65 ft and bedrock aquifers at a depth of 110 ft. Groundwater flow was towards the Mississippi River, with an average velocity of 1.7 ft per day. The disposal facilities are close to a groundwater divide where hydrological connections exist between the water table and bedrock aquifers. Chemical wastes lower the pH and increase the concentration of organics, BOD, and phenols. The soils act as an effective agent for temporary removal of metals but water soluble organics move easily through the soil. Thus, design for pits receiving chemical wastes should aim at protecting the groundwater through containment and collection of leachates. Wastes may be treated by increasing pH, providing adsorptive surfaces, and encouraging microbiological growth to aid the decomposition of organic substances. (Prague-FIRL)
W74-10278

HIGH-LEVEL COPPER FEEDING OF SWINE AND POULTRY AND THE ECOLOGY,
Florida Univ., Gainesville.
G. K. Davis.
Federation Proceedings, Vol 33, 2 tab, 25 ref.

Descriptors: *Copper, *Toxicity, Animals, Diets, Feeding, Agriculture, Livestock, Water pollution, Soils, *Farm wastes, Molybdenum, *Poultry, *Hogs, Sheep.

Swine and poultry have been fed high levels of copper to increase their growth. In localized areas their fecal wastes has raised the environmental level of copper and created a problem. For example, in bodies of water, copper adversely affects aquatic organisms and on land it may endanger plants and crops. In addition, animals which eat these plants may have toxic reactions. Sheep, as the most sensitive to copper toxicity, are susceptible to these increased levels only if they have inadequate dietary molybdenum. Monitoring copper feedings and knowledge of appropriate countermeasures (such as addition of lime) are necessary to control this problem. (Prague-FIRL)
W74-10295

CONSEQUENCES OF HIGH NITRATE LEVELS IN FEED AND WATER SUPPLIES,
South Dakota State Univ., Brookings. Dept. of Biochemistry.
For primary bibliographic entry see Field 5C.
W74-10296

GRAYS HARBOR ESTUARY, WASHINGTON; REPORT 1, VERIFICATION AND BASE TESTS. APPENDIX A: SUPPLEMENTARY BASE TEST DATA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-10317

SALT TOLERANCE OF MEXICAN WHEAT: I. EFFECT OF NO3 AND NACL ON MINERAL NUTRITION, GROWTH, AND GRAIN PRODUCTION OF FOUR WHEATS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
For primary bibliographic entry see Field 3C.
W74-10328

MEASUREMENT OF THE DIFFUSION COEFFICIENT OF BORON IN SOIL USING A SINGLE CELL TECHNIQUE,
College of Agriculture, Sungei Besi (Malaysia).
W. Sulaiman, and B. D. Kay.
Soil Science Society of America Proceedings, Vol 36, No 5, p 746-752, September-October, 1972. 5 fig, 3 tab, 20 ref.

Descriptors: *Nutrient removal, *Boron, *Trace elements, Nutrients, *Diffusion, Soil chemistry, Soil physics, Soil water, *Path of pollutants.

The porous system diffusion coefficient, Dp, of boron in a loam soil was measured by means of a single cell technique. Boron diffused from a semi-infinite medium of uniform initial concentration to a sink of constant concentration which was separated from the soil by a dialysis membrane. A polyethylene glycol 6,000 solution circulated through the sink and controlled the soil matric suction osmotically. The diffusive flux at the soil and membrane interface was treated as an evaporative process. The value of Dp was found to be 2.44 plus or minus 0.00000017 sq. cm/sec. when the bulk density of the soil and the volumetric moisture content were 1.30 gm/cm3 and 0.31, respectively. The significance of the equilibria between absorbed and solution B on the diffusion rate of B was also studied. Addition to the soil of boric acid solutions of concentrations lower than 1 ppm resulted in a capacity factor and solution B concentration which were lower than the corresponding values when water containing no B was added. As a consequence, the quantity of B diffusing into the sink from the boron-treated soil was less than that from the untreated soil. (Skogerboe-Colorado State)
W74-10329

NITRATE-N ACCUMULATION IN THE SOIL PROFILE UNDER ALFALFA,
Illinos Univ., Dept. of Agronomy. Urbana.
D. L. Schertz, and D. A. Miller.
Agronomy Journal, Vol 64, No 5, p 660-664, September-October, 1972. 7 fig, 4 tab, 10 ref.

Descriptors: Nutrient removal, *Nitrates, *Alfalfa, Leaching, Water pollution sources, Rotations, Crop production, Crop response, *Path of pollutants, *Soil profiles.
Identifiers: *Nitrate nitrogen.

Eight split applications of N totaling 0, 224, 448, and 672 kg/ha (0, 200, 400, and 600 pounds/acre) were studied at Urbana, Illinois, at various depths on six sampling dates. Soil was sampled at depths of 0 to 15, 15 to 30, 30 to 60, 60 to 90, and 90 to 105 cm or to the water table, which was never lower than 105 cm. Soil samples were dried, finely ground, and analyzed for nitrate nitrogen. Nitrate nitrogen concentrations were greatest in March 1970 at the 30- to 60-cm depth. No more than 1 ppm was found at the 90- to 105-cm depth (water table) for any N treatments on November 11, 1970. Highest concentrations of nitrate nitrogen were found at the 15- to 30-cm depth for all N treatments at the end of the growing season, November 11. Although total amounts of nitrate nitrogen were lower in March than in November, the highest accumulations were found at the 30- to 60-cm depth in March, but at the 15- to 30-cm depth in November. The only treatment on November 11 that did not show a significant difference when compared to the check was the 224 kg N/ha. (Skogerboe-Colorado State)
W74-10330

FURTHER CONTRIBUTION TO THE STUDY OF NITRIFICATION IN THE SEA AND IN A BRACKISH WATER ENVIRONMENT (IN ITALIAN),
Messina Univ. (Italy). Istituto di Idrobiologia.
V. Bruni, and T. Maugeri.
Boll Pesca Piscic Idrobiol, Vol 26, No 1/2, p 77-86, 1971. English summary.

Descriptors: *Aerobic fermentation, *Anaerobic nitrification, Autotrophic nitrification, Brackish water, Environment, *Heterotrophic nitrification, Nitrates, *Nitrification, Nitrites, Sea water.

Microbial nitrification was investigated on several samples from different places. Results confirm the slowness of the transformation to nitrate as compared with transformation to nitrite and, beside the known aerobic fermentation, an anaerobic nitrification also occurs. The remarkable positiveness of the transformation to nitrite in samples rich in organic matter is in accordance with the possibility of an heterotrophic with the autotrophic nitrification.--Copyright 1973, Biological Abstracts, Inc.
W74-10341

QUALITY OF DRAINAGE WATER FROM A HEAVY-TEXTURED SOIL,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
G. O. Schwab, E. O. McLean, A. C. Waldron, R. K. White, and D. W. Michener.
Paper No. 72-733 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972, Chicago, Illinois. 13 p, 2 fig, 4 tab, 11 ref.

Descriptors: *Drainage, *Subsurface drainage, *Tile drainage, Water quality, Salinity, Water chemistry, Ion transport, *Soil texture, Dissolved solids, Biochemical oxygen demand, *Ohio, Hydrogen ion concentration, Electrical conductance.

Sediment, dissolved solids, nine chemical elements or ions, five pesticides, electrical conductivity, pH, and BOD in tile effluent and in surface runoff were measured from field plots in Toledo silty clay soil near Sandusky, Ohio, for the period 1969-71. Measurements were taken from both conventional tilled and no tilled plots in continuous corn. Laboratory studies were also made on phosphorus movement. (Skogerboe-Colorado State)
W74-10346

5C. Effects Of Pollution

AQUATIC FUNGI IN RIVERS: THEIR DISTRIBUTION AND RESPONSE TO POLLUTANTS,
Virginia Polytechnic Inst. State Univ., Blacksburg. Dept. of Biology.
D. F. Farr, and R. A. Paterson.
Available from the National Technical Information Service as PB-233 790 $3.25 in paper copy, $1.45 in microfiche. Virginia Water Resources Research Center, Blacksburg, Bulletin 68, April 1974. 45 p, 5 tab, 11 fig, 20 ref. OWRR A-043-VA(2).

Descriptors: *Aquatic fungi, Lotic environment, Nutrients, Heavy Metals, *Virginia, Distribution, *Zinc, Water pollution effects, Water pollution sources.
Identifiers: *New River(Va), Little Stony Creek(Va), *Cyanide, *Mannitol, Blacksburg(Va), *Phycomycetes, *Achyla caroliniana, *Rhizidium sp.

Two lotic habitats in the vicinity of Blacksburg, Va were selected for field investigations. The New River represented a river with a high nutrient load. Little Stony Creek, a tributary of the New River, has no sources of man-made effluent which might contribute nutrients to the stream. Collecting sites on the New River were located above, just below, and some distance farther downstream from the effluent outfall of a munitions plant. The effect of this effluent on the number of taxa was not conspicuous. However, there was a reduction in the number of taxa per collection at the station near the effluent when compared with the other stations. Filamentous aquatic Phycomycetes, such as Achyla, Saprolegnia, and Pythium were commonly found in both habitats. However, greater diversity of the chytrid type of aquatic Phycomycete was found in Little Stony Creek as compared to New River. Twelve chytrid taxa were found in Little Stony Creek and two in New River. Two fungi, Achyla caroliniana from the New River and Rhizidium sp. from Little Stony Creek, were studied in pure culture in terms of the effect of common pollutants on their growth and reproduction. The A. caroliniana had higher tolerances to zinc, cyanide, and mannitol as compared to the Rhizidium sp. The Rhizidium was more tolerant to higher concentrations of detergents than the Achyla.
W74-09810

IODINE METABOLISM IN CHILDREN AND ADOLESCENTS IN AN AREA OF THE COMMUNITY,
Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucleaires.
L. Karhausen.
Avail: NTIS, Springfield, Va., as Rept. No. AEC-tr-7481; $5.45/copy, $1.45/microfiche. Atomic Energy Commission Report AEC-tr-7481, 1974. Translation of French report EUR-4864, (1974). 140 p, 30 fig, 44 tab, 75 ref.

Descriptors: *Kinetics, *Transfer, *Iodine, *Human population, *Model studies, *Digestion, Fallout, Transfer, Path of pollutants, Biology, Biocontrol, Food chains, Metabolism, Age, Growth stages, Safety, Standards, Biochemical.

The aim is to establish a European model of thyroid function during growth and from it to draw conclusions with regard to radiation protection. Kinetic studies involving iodine 131 and iodine 125 were carried out on 46 infants and 47 adolescents. A three-compartment model is presented for age groups from 0 to 6 months, six months to one year, one to two years, and for adolescents and adults. The International Commission on Radiation Protection diameters were calculated for the various age groups. These models were then applied to radiation protection and an attempt was made to determine whether the representation could be simplified by reducing it to two compartments. This appears feasible if application is limited to thyroid dosimetry. In the second part of the study, the aim is to extend this model to other areas of the Community, where the iodine ingested and the thyroid uptake are undoubtedly different from those observed in the first study. (Houser-ORNL)
W74-09827

RADIOBIOLOGY AND RADIOECOLOGY OF FARM ANIMALS.
Atomizdat, Moscow (USSR).
Avail: NTIS, Springfield, Va., as Rept. AEC-TR-7523; $7.60/copy, $1.45/microfiche. Atomic Energy Commission Report AEC-TR-7523, 1973. Translation by B. N. Annekov, I. K. Dibobes, and R. M. Aleksakhin, Radiobiologiya i Radioekologiya Sel 'skokhozyaistvennykh Zhivotnykh, 1973. 224 p, 33 fig, 107 tab, 395 ref.

Descriptors: *Radioecology, *Radioisotopes, *Food chains, Transfer, Hydrologic cycle, *Absorption, *Fallout, Movement, *Path of pollutants, Diffusion, Environment, Animal metabolism, Digestion, Plants, Human population, Public health, Biology, Bioindicators, Agriculture.

Problems are discussed of the migration of the most important artificial radionuclides in the biological chain of fodder – farm animals. The metabolism of radionuclides in the bodies of farm animals and the effect of external irradiation and incorporated radionuclides on these animals are examined. The results of extensive experimental studies conducted in the USSR and abroad are summarized. In addition to their theoretical interest, the data presented are of practical value in developing measures for reducing the conversion of radioactive substances into livestock and agricultural products. (Houser-ORNL)
W74-09828

PROJECT RIO BLANCO: PROMPT ECOLOGICAL EFFECTS RESULTING FROM GROUND MOTION,
Geonuclear Corp., Las Vegas, Nev.
F. W. Whicker, A. W. Alldredge, and W. C. Hanson.
Aval: NTIS, Springfield, Va., as Rept. No. PNE-RB-47; $5.45/copy, $1.45/microfiche. Report No. PNE-RB-47, July 17, 1973. 71 p, 31 fig, 6 tab.

Descriptors: *Nuclear explosions, *Secondary recovery(Oil), *Natural gas, *Ecology, Ecosystems, *Environmental effects, Animal behavior, Fish behavior, Birds, Nesting, Speciation, Varieties, Water pollution, Suspended solids, Solutes, Streams, *Colorado.
Identifiers: *Fawn Creed(Colo).

Project Rio Blanco, an experiment involving deep underground detonation of three, 30-kiloton nuclear explosives designed to stimulate natural gas production in geologic formations of low permeability, was conducted on 17 May 1973. The emplacement well (EW) for this experiment was located in the Fawn Creek drainage, a tributary of Piceance Creek, in western Colorado some 30 miles southwest of the town of Meeker. The three nuclear explosives for Project Rio Blanco were detonated at 1000:00.12 plus or minus 0.01 second Mountain Daylight Time, or 1600:00 plus or minus 0.01 second, Greenwich Mean Time. The three explosions occurred within the Fort Union and Mesaverde formations at depths of 5,838.5 feet, 6,229.7 feet, and 6,689.5 feet. A brief discussion of the ecological effects is presented. (Houser-ORNL)
W74-09831

ELECTRICAL ENERGY AND ITS ENVIRONMENTAL IMPACT - PROGRESS REPORT DECEMBER 31, 1972.
Oak Ridge National Lab., Tenn.

Aval: NTIS, Springfield, Va., as Rept. No. ORNL-NSF-EP-40; $5.45/copy, $1.45/microfiche. Report No. ORNL-NSF-EP-40, March 1973. 125 p, 7 fig, 21 tab, 123 ref.

Descriptors: *Energy, *Environmental effects, *Coals, Economics, Ecology, Air pollution, Fallout, Effluents, Water pollution, Soil contamination, Fuels, Radioactivity, Natural resources, Trace elements, Lakes, Streams, *Mining.

In considering environmental problems related to energy, the impacts from the production and use of coal are particularly noted. Work has included several investigations of the impacts and possible alternatives in coal mining, particularly the widespread devastation that has occurred in the Appalachian Mountain regions. Feasible alternatives, both technological and economic, will be examined for obtaining adequate energy supplies at an acceptable environmental cost. An experimental investigation is underway of the emission of toxic trace elements from a coal-fired power plant. In this work, the quantities of each element emitted from the plant and the levels of buildup in the environment will be determined. The hope is to make some contribution to a more rational use of the nation's limited resources in fuels, land, air, and water. (Houser-ORNL)
W74-09836

PRELIMINARY EVALUATION OF METHODS FOR THE DISPOSAL OF TRITIATED WATER FROM NUCLEARLY STIMULATED NATURAL GAS WELLS,
Oak Ridge National Lab., Tenn.
W. D. Arnold, R. Salmon, K. H. Lin, and W. DeLaguna.
Aval: NTIS, Springfield, Va., as Rept. No. ORNL-TM-4024; $4.00/copy, $1.45/microfiche. Report No. ORNL-TM-4024, April 1973. 52 p, 3 fig, 4 tab, append.

Descriptors: *Radioactive waste disposal, *Tritium, *Safety, *Evaluation, *Nuclear explosions, *Secondary recovery(Oil), *Gases, *Natural gas, Water pollution, Water pollution sources, Assay, Assessment, Environmental effects, Public health.

Large volumes of slightly tritiated water will be produced from natural gas fields developed via nuclear stimulation. The Rio Blanco field in Colorado, for example, could produce more than 1 billion gal of water with a tritium activity of about 525 microCi/gal. Proper disposal of the tritiated water is essential to the success of nuclear stimulation in natural gas recovery. Evaluations based on feabibility, safety, and cost indicate that injection into deep wells, evaporation into stacks, and evaporation from ponds are the best disposal methods. At this point, none of the three is clearly superior to the others. Each has potential advantages and disadvantages that can best be evaluated in actual tests. These disposal tests can be made in conjunction with the production testing of the first Rio Blanco well. While no unfavorable environmental effects would be expected from the tests, they can be monitored to ensure that this is the case and can be terminated if necessary. (Houser-ORNL)
W74-09837

ENVIRONMENTAL MONITORING AT MAJOR U.S. ATOMIC ENERGY COMMISSION CONTRACTOR SITES, CALENDAR YEAR 1972.
Division of Operational Safety (AEC), Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-09840

OFFSHORE NUCLEAR POWER SITING WORKSHOP.
Division of Biomedical and Environmental Research (AEC), Washington, D.C.
Available from NTIS, Springfield, Va. as Rept No WASH-1280; $4/copy, $1.45/microfiche. Workshop held in Rockville, Maryland October 15-16, 1973 Report No WASH-1280, (1973). 44 p, 2 fig, 57 ref.

Descriptors: *Nuclear powerplants, *Nuclear reactors, *Sites, Oceans, *Offshore platforms, Coastal structures, Environment, Environmental effects, Aquatic environment, Oceanography, Geochemical, Marine biology, Water pollution, Public health.

This report is the product of a workshop meeting held to discuss potential marine environmental problems connected with the construction and operation of nuclear power plants which will be located in the near shore coastal regions. Approximately 40 persons were in attendance representing academic oceanographic research organizations, Federal agencies with coastal marine interests and both the Office of Regulation and other Headquarters Divisions of AEC. Many scientific disciplines and aspects were represented and discussed. The workshop approached the environmental problems from three viewpoints: air-sea interactions (physical oceanography); water-sediment interactions (geochemical); and marine biology. Evaluation were made by each group on the following: (1) Current technical knowledge of the selected area as related to floating nuclear plant (FNP) environmental impact; (2) Capability of today's 'state-of-the-art' in assessment of environmental impact of FNP in the marine environment; and (3) Estimation of the level of effort and time frame required to obtain necessary information to fill the gaps in current knowledge of the subject area. (See W74-09863 thru W74-09865) (Houser-ORNL)
W74-09862

WATER MOTION AND WATER-SEDIMENT INTERACTION,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5B.
W74-09863

BIOLOGICAL ASPECTS OF OFFSHORE NUCLEAR POWER PLANTS,
Scripps Institution of Oceanography, La Jolla, Calif.
R. Eppley, C. Yentsch, L. McHugh, H. Hamilton, and K. Sherman.
In: Offshore Nuclear Power Siting Workshop Report No WASH-1280, p 17-28, (1973). 18 ref.

Descriptors: *Environmental effects, *Nuclear powerplants, *Offshore platforms, *Sites, *Effluents, Biology, *Biodegradation, Biological communities, Radioactivity, Water pollution, Ecology ecosystems, Food chains, Public health, Construction, Operations.

Possible environmental biological problems that would be associated with the construction and operation of offshore nuclear powered electrical generating stations are described. One objective was to identify and characterize research needs. Possible causes of impacts that could be associated with construction, the structures themselves, and operation of offshore nuclear generating stations were identified. Possible impacts are classed by 'causes' as: physical-mechanical, thermal, chemical or radiological. The possibilities of obtaining information in order to evaluate biological effects are addressed. The important questions asked are: (1) What is the base line of information. (2) What is the areal extent of the problems. (3) What is the temporal nature of the effects or of the problems. (4) Are some aspects of impacts of the power plant non-detrimental. Research which should be undertaken to understand the problems was identified. (See also W74-09862) (Houser-ORNL)
W74-09864

OCEANIC ATMOSPHERIC DISPERSION,
Woods Hole Oceanographic Institution, Mass.
G. Csanad, P. Frenzen, P. Michael, D. Slade, and A. Hersch.
In: Offshore Nuclear Power Siting Workshop Report No WASH-1280, p 29-36, (1973). 2 fig, 1 ref.

Descriptors: *Nuclear powerplants, *Nuclear reactors, *Sites, *Offshore platforms, Effluents, *Oceans, *Atmosphere, *Disperson, Air circulation, Meteorology, Radioactivity, Iodine, Tritium, Air, Water, Boundary processes, Mass transfer, Transmissivity, Research and development, Research priorities, Environment, Ecology.

A typical two-unit plant will reject excess heat at a calculated rate over roughly 20 square kilometers. Unless a strong net advective current is present, an accumulation of heat and chemical pollutants will occur in the neighborhood of the plant, leading to adverse ecological consequences and likely violations of state thermal standards. Furthermore, the relatively long-residence time of dilution water under conditions of weak net flow will increase the impact of biological entrainment. One major goal of a research program should be to establish the extent of 'influence zones' adjacent to offshore power plants. Research on atmospheric dispersal problems is recommended in three areas: (A) turbulence and diffusion in maritime planetary boundary layer; (B) mesoscale circulations; and (C) air-sea mass exchange. Volatile compounds such as methyl iodide, radioactive nobel gases and tritium partition between the atmosphere and the sea. Particulates may adhere to the water surface or enter the water column. The surface ocean spray may act to wash these components out of this boundary layer. As a result of these and similar processes, mass transfer from air to sea takes places which is qualitatively characterized by the value of the 'deposition velocity.' The deposition velocity for the gases and particulates concerned has not been defined and mass transfer coefficients between air and sea water are largely unknown for the individual species. (See also W74-09862) (Houser-ORNL)
W74-09865

THE REGULATION OF THE ENVIRONMENTAL EFFECTS OF NUCLEAR POWER PLANTS,
Consolidated Edison Co. of New York, Inc., New York.
J. P. Davis.
Nuclear Safety, Vol 14, No 3, p 165-181, May-June 1973. 122 ref.

Descriptors: *Radioactivity, *Environmental effects, *Nuclear powerplants, Effluents, Gases, Liquids, Solid wastes, *Regulation, Standards, Legal aspects, Aesthetics, Sites, Public health, Toxicity.

The radiological and nonradiological effects of nuclear power generation on the environment and the means for their regulation are discussed along with some related cases and controversies. Proposals for improvements through changes in procedures and new legislation are also examined. (Houser-ORNL)
W74-09866

PU-238 INCORPORATED IN FISH LIVING IN WATER CONTAINING PUO2/238,
Los Alamos Scientific Lab., N. Mex.
W. H. Adams, and E. B. Fowler.
Available from NTIS, Springfield, Va. as Rept No LA-DC-12899; $4/copy, $1.45/microfiehc. Report No LA-DC-12899, February 1970. 8 p, 5 tab.

Descriptors: *Fish, *Plutonium, *Biology, Absorption, Radioisotopes, Oxides, Solubility.
Identifiers: Concentration, Whole body, *Body organs.

Described are two studies of fish exposed to water with known concentrations of plutonium-238. Tabular data are given for radioactivity found in the fish after varying days exposure to plutonium. Control data were maintained for the concentration of the water for days from 9 to 185. The concentrations of plutonium in various body parts are given. Similar data were recorded for snails grown in 238-PuO-2 spiked water. (Houser-ORNL)
W74-09867

POSSIBLE EFFECTS OF IONIZING RADIATION UPON MARINE LIFE AND SOME IMPLICATIONS OF POSTULATED ACCIDENTAL RELEASES OF RADIOACTIVITY,
California Univ., Los Angeles. Office of Environmental Science and Engineering.
A. F. Moscati, and R. C. Erdmann.
Nuclear Technology, Vol 22, No 2, p 184-190, May 1974. 3 tab, 11 ref.

Descriptors: *Radioactivity effects, *Water pollution effects, *Food chains, Ecology, *Genetics, Population, *Aquatic life, Aquatic animals, Aquatic plants, Sessile algae, Plankton, Shellfish, Fish, Path of pollutant, Dispersion, Waste dilution, Model studies, Accidents, Analysis.
Identifiers: Concentration, *Specific activity, Critical radionuclide.

Two models for predicting the impact of radioactivity in the food chain upon man are reviewed: (a) the critical pathway concept, and (b) the specific activity approach. In an accident situation involving the release of radioactivity from a light-water power reactor to the ocean, the most important radionuclides on the basis of the type of radiations emitted, quantity produced, half-life, and biological significance are the fission products Sr-90, Cs-137, Pu-239, and the activation products Zn-65, Fe-54, and Zr-95. The specific activity approach as applied to three classes of accidental radioactive releases to the sea can be used to determine the sensitive nuclide for each release and to estimate the relative degree of seriousness of each release by calculating the volume of seawater needed to dilute each spill to the maximum permissible concentration of the critical nuclide. Estimates are made for three types of accidental releases at sea. (Houser-ORNL)
W74-09871

POPULATION DOSES FROM THE NUCLEAR INDUSTRY TO 2000 A.D.
Nuclear Safety, Vol 15, No 1, p 56-66, Jan-Feb 1974. 4 fig, 5 tab, 13 ref.

Descriptors: *Nuclear energy, *Nuclear powerplants, *Nuclear wastes, *Effluents, *Environmental effects, Radioactivity, Liquid wastes, Gases, Solid wastes, Toxicity, Human population, Standards, Regulation, Forecasting, Estimating, Biocontrol, Biodegradation, Radioisotopes, Path of pollutants, Tritium, Iodine, Cesium.
Identifiers: Doses.

During the next few decades, it is anticipated that the nuclear power industry in the United States will undergo a remarkable growth. To project the effect of this growth on the radiation doses to the general public, the U.S. Atomic Energy Commission made a review of current reactor operating experiences. From this review a detailed analysis of the radiation dose to a major section of the country due to effluents from nuclear facilities for conditions projected for the year 2000 was undertaken. The study indicates that the average dose to the U.S. population from nuclear power will increase from an estimated 0.003 mrem per person in 1970 to as much as 0.2 mrem in the year 2000. This contribution remains a small fraction of the radiation dose from either natural or man-made sources of ionizing radiation. (Houser-ORNL)
W74-09872

ADDITIONAL HIGH LEVEL WASTE FACILITIES--SAVANNAH RIVER PLANT, AIKEN, SOUTH CAROLINA, (DRAFT ENVIRONMENTAL STATEMENT).
Atomic Energy Commission, Washington, D.C.
Available from NTIS, Springfield, Va., as Rept No WASH-1530, $5.45/copy, $1.45/microfiche. Report No WASH-1530, January 1974. 86 p, 25 fig, 5 tab, 15 ref, 2 append.

Descriptors: *Radioactive waste disposal, *Waste storage, *Nuclear powerplants, Effluents, Fuels, Industrial production, *Radioactivity effects, Environmental effects, Assessment, Safety, Evaluation, *South Carolina.
Identifiers: Fuel fabrication, *Savannah River, *Environmental Impact Statement, Storage containers, Tanks.

This environmental statement was prepared in accordance with the National Environmental Policy Act and in support of the U.S. Atomic Energy Commission's proposal for legislative authorization and appropriations for the design and construction of project 75-SR-001 'Additional High Level Waste Storage Facilities, Savannah River, South Carolina.' Additional waste tanks and evaporators are needed to meet forecast production of nuclear materials, and to replace older tanks which will be removed from service for detailed examination. The proposed addition to present waste management facilities will consist of six 1.3-million gallon high activity waste tanks, a waste evaporator, and associated auxiliaries. The proposed tanks will incorporate the latest technology pertaining to fabrication, stress relieving, inspection techniques and acceptance testing. Special consideration will be given to improved methods of integrity monitoring and safe operating techniques. (Houser-ORNL)
W74-09873

EXPERIMENTAL WATER TOXICOLOGY,
G. P. Andrushaytis.
Available from NTIS, Springfield, Va. 22151 AD-760 400, Price $3.75 printed copy; $1.45 microfiche. Army Foreign Science and Technology Center Technical Translation Report FSTC-HT-23-163-73, March 1973. 29 p, 6 fig, 1 tab. (Translated from Biology Institute of the Latvian Academy of Sciences, by the Universal Language Services, Inc.)

Descriptors: *Pesticides, *Water pollution effects, Reviews, *Toxicity, Toxins.
Identifiers: *Toxicology, *USSR.

Problems in water toxology are reviewed. Current research in the USSR is outlined. Individual articles are devoted to such subjects as blood analysis of fish subjected to Diuron and the effect of 2,4,-D acid. (Knapp-USGS)
W74-09889

LAKE MICHIGAN,
J. Parker.
In: Our Environment: The Outlook for 1980, Part I: Our Environment: Water, Edited by Alfred J. Van Tassel, Lexington Books, Lexington, Mass., p 25-50, 1973. 1 fig, 9 tab, 20 ref.

Descriptors: *Lake Michigan, *Water quality, Water quality control, *Water pollution, *Biochemical oxygen demand, Watershed management, Treatment, Pollution abatement, Water pollution treatment, Water pollution effects, Projections, Municipal wastes, Industrial wastes, Thermal pollution.
Identifiers: Milwaukee(Wisc.), Chicago(Ill.), Green Bay(Wisc.), Calumet(Ind.), 1980 water quality projections.

Lake Michigan, the sixth largest freshwater lake in the world, has a surface area of approximately 22,400 square miles. Rivers tributary to the lake are long, allowing purification of wastes prior to discharge. The size of the lake and the lengths of its tributaries make water pollution problems local in nature, with the greater portion of the lakewater of good quality. Between 1970 and 1980 the population within the watershed boundary is expected to increase 12.2% from 6,330,000 to 7,105,000. Industrial waste is the greatest overall source of pollution. Municipal sewage can pose a significant local problem, and its importance will increase as sparsely populated communities develop integrated sewer systems. Remedies are treatment facilities, which include secondary treatment and 80% phosphate removal by 1972 for all major municipalities, and legislative abatement programs enacted by the Four State Enforcement Conference. These programs include continuous disinfection of municipal effluents, treatment facilities for industrial plants, and prohibition of combined sewers. It is estimated that the highly industrialized Calumet area and the Greater Chicago area will see a gradual improvement in water quality due to advanced waste treatment. The Milwaukee Area which will discharge 176 million pounds of BOD in 1980, will not be able to upgrade its already efficient removal capacity enough to significantly improve water quality, and the Green Bay Area water is already so polluted that even advanced treatment projects now underway will be incapable of generating a satisfactory quality water. In general there is good cause to believe that Lake Michigan water will improve in quality by 1980. (See also W74-09964) (LaPointe-North Carolina)
W74-09953

LAKE ERIE,
R. Vollkommer.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 51-74, 1973, 5 fig, 6 tab, 19 ref, 1 append.

Descriptors: *Lake Erie, *Water quality control, *Water pollution, *Biochemical oxygen demand, Watershed management, Treatment, Pollution abatement, Water pollution treatment, Water pollution effects, Basins, Projections, Municipal wastes, Industrial wastes, Thermal pollution, Phosphorus, Nitrates.
Identifiers: +(*) WATER QUALITY PROJECTIONS.

Lake Erie, with 3 major subbasins, western, central and eastern, serves as a drainage basin for a low level, clay rich land formed by glacier abrasion and depositions. Because of its shallowness and large silt input the western basin is the most turbid, with high algal productivity. Summer thermal stratification causes rapid oxygen depletion toward the bottom. Pollution loads are also highest in this basin with BOD discharged (309 million pounds in 1966) nearly 3 times as great as either of the other 2 basins and phosphorus and nitrate concentrations the highest in all of Lake Erie. Much of the shoreline is a health hazard. The central basin, with overenriched turbid water and excessive algal growth, receives nutrient wastes from 2.9 million people. The eastern basin, serving the cities of Erie, Pa., and Buffalo, N.Y. has the least serious damage due to its large depth and volume and low pollutant discharge. The fundamental problem of Lake Erie is the overenrichment with essential plant nutrients compounded by shallowness, warmth, and natural sedimentary input. The major source of pollution (BOD AND NUTRIENTS) is in the form of municipal sewage. Assuming 90% efficient secondary treatment by 1980 on all sewage, the population equivalent drops by a factor of five. Major pollution sources are steel, paper, rubber, chemical, and food industries, with rapid industrial growth anticipated. Provisions will have to be made to overcome the additional load arising from increasing population and industrial growth, to reduce the nutrient levels along with BOD reduction, and to eliminate other pollutants causing discoloration, odors, and toxicity. (See also W74-09964) (LaPointe-North Carolina)
W74-09954

PUGET SOUND,
D. G. Niddrie.
In: Our Environment: The Outlook for 1980, Part I. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass, p 75-94, 1973, 3 tab, 9 ref, append.

Descriptors: *Water quality, Water quality control, *Water pollution, *Biochemical oxygen demand, Watershed management, Treatment, Pollution abatement, Water pollution treatment, Water pollution effects, Basins, Projections, Municipal wastes, Industrial wastes, Thermal pollution, *Washington.
Identifiers: *1980 water quality projections, *Puget Sound(Wash.), Snohomish County(Wash.), Pierce County(Wash.).

Puget Sound is a deep salt water basin with a total surface area of 650,000 acres and 1,330 miles of shoreline. Because of its wide area and great depths (up to 930 feet), the sound has an enormous natural assimilative capacity. Pollution problems, thus, are restricted to small areas of the sound where large discharges occur. Domestic wastes do not contribute in any great extent to the degradation of water quality. Serious pollution problems do occur, however, from industrial wastes, most importantly the pulp and paper industry, contributing in many areas greater than 90% of the BOD load. The State of Washington has developed a very effective pollution abatement program which is administered by the Department of Ecology. The program consists of specific stream standards for every watercourse in the state, treatment requirements for compliance with the standards, the issuance of waste disposal permits to control industrial waste discharge, on-site inspection and monitoring of treatment facilities, and the levying of civil penalties to any waste permit violator. Due in large measure to this program presently undeveloped areas of Puget Sound will not undergo degradation in the future. However specific industrialized counties may encounter localized problems, among these Snohomish County (453 million pounds BOD by 1980, 93% attritutable to pulp and paper operations), and Pierce County. Whether treatment facilities such as the Georgia-Pacific pulp waste treatment plant in Bellingham will be able to maintain or improve current water quality is still uncertain. (See also W74-09964) (LaPointe-North Carolina)
W74-09955

SAN FRANCISCO BAY,
R. A. Matern.
In: Our Environmental: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A.J. Van Tassel, Lexington Books, Lexington, Mass., p 95-125, 1973, 4 fig, 6 tab, 8 ref, 4 append.

Descriptors: *Bays, *Water quality, Water quality control, *Water pollution, *Biochemical oxygen demand, *Pollution abatement, Watershed management, Interceptor sewers, Water pollution treatment, Water pollution effects, Coliforms, Projections, Municipal wastes, Industrial wastes, California.
Identifiers: *San Francisco Bay, *1980 water quality projection.

The San Francisco Bay system includes a total distance of 85 miles extending from Chipps Island to the mouth of Coyote Creek near San Jose. The Bay is very shallow with an average depth of about 20 feet. The principal fresh water inflows are the San Joaquin and Sacramento River basins, comprising nearly 40% of the total area of the State of California. To combat severe water quality problems the State Water Resources Control Board, in March of 1969, issued a report detailing concrete solutions. The proposed program consists of three phases. Phase 1 to be completed in 1980 at an estimated total cost of $1,473 million, includes the construction of a system of 5 interceptors which would discharge wastewater into large treatment facilities or into deep bay water. Wastewater discharges from South Bay, San Pablo, and Suisun Bay areas would be completely eliminated. Phase 2 consists of providing a disposal system to the ocean, which has 4 times the dilution capability of the bay. By 1990 BOD removal, for the entire Bay-Delta area should be 85%. Phase 3 has two options, one for water reclamation, and one for protection of estuarine environments. Industrial growth in the next decade will be very rapid especially in certain industries associated with high BOD discharges (often located in the South Bay area). Among them are cane sugar refining, canned fruits and vegetables, paper mills, and paper coating. At present the worst water quality parameter is that of coliform bacteria with concentrations measured as high as 2 million per 100 ml. in the South Bay area. Between 1963 and 1968 31 fishkills were also reported. Despite large expenditures, there is little likelihood for any significant improvement in water quality by 1980. (See also W74-09964) (LaPointe-North Carolina)
W74-09956

LONG ISLAND SOUND,
R. T. Caponi.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 127-147, 1973, 2 fig, 1 tab, 29 ref.

Descriptors: *Water quality, Water quality control, *Water pollution, *Biochemical oxygen demand, *Nutrients, Watershed management, Water pollution treatment, Legislation, Water pollution effects, Boating, Shellfish farming, Sounds, Projections, Municipal wastes, Industrial wastes, Thermal pollution, *New York, New Jersey, Connecticut.
Identifiers: *Long Island Sound(N.Y.), *Interstate Sanitation Commission, 1980 water quality projections.

The major pollution sources for the Long Island Sound, which has an area of 930 sq. mi. and an average depth of 60 feet, are the numerous primary and secondary sewage treatment plants which serve the 1,300,000 people living in the direct vicinity. The Connecticut River Basin, the Housatonic River Basin, and the Thames River Basin are chief fresh water contributors. The major problem arising from pollution discharge are plant nutrients leading to excessive growths of algae, and bacteria concentrations. Long Island is a heavily touristed area and the worsening water quality is damaging this industry as well as the once thriving shellfish industry (76,000 of 183,000 acres suitable for shellfishing have been closed due to pollution). In 1936 the Interstate Sanitation Commission (N.Y., N.J., and Conn.) was found and proceeded to classify and oversee the majority of waters in the tristate area. In 1967 the three states agreed to secondary treatment for all their municipal plants by 1972, and New York and Connecticut voters have approved bond issues for construction of plants. Such treatment capacity will be needed to handle the increased population projected to be 1,400,000 by 1980. Controls must also be established from industrial discharges of pharmaceutical and paper industries on the Thames and Mill Rivers in Connecticut, oil spills from harbor tankers, and human waste and gasoline discharges from pleasure boating. (See also W74-09964) (LaPointe-North Carolina)
W74-09957

HUDSON RIVER,
R. M. Martin.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 149-174, 1973. 11 tab, 27 ref.

Descriptors: *Hudson River, *Water quality, Water quality control, *Water pollution, *Nutrients, Biochemical oxygen demand, Watershed management, Water pollution treatment, Water pollution effects, *Pulp wastes, Pulp and paper industry, Projections, Municipal wastes, Industrial wastes, *New York, New Jersey, Bond issues.
Identifiers: *1980 Water quality projections.

Tidal influence is a major factor in the recirculation rate of nutrients during the dry months in the Hudson River. Fresh water inflow is sufficient for an exchange rate of only about 0.3-2.5% per day. With a drainage area of 12,400 to 14,500 sq. mi., serving a population of about 12 million, the Hudson is severely subject to high nutrient loadings. Phosphorus concentrations in Manhattan have been as high as 4 times that of an unpolluted water (12 ppb vs. 2.8 ppb). Projections indicate that Mid Hudson and Lower Hudson (New York City) areas will experience the most significant growth in this decade, with a total state population of 20 million by 1980. Industrial growth is expected to shift from 'non durables' such as food processing and textiles to less polluting 'durables' like machinery, with the phase out of some heavily polluting paper mills in the north. The grossly different population densities along its course together with the river's strong regenerative capacity, necessitate an analysis of the Hudson by sectors. The Upper Hudson, or Albany area, due to heavy waste discharge from paper mills, has been characterized as an 'open sewer'; however phase out of many of these mills should mean improved water quality. Similar progress will be seen in the Mohawk area because of heavy emphasis on sewage treatment combined with light industrial discharge. The Mid Hudson region, with a high natural assimilative capacity, will continue to experience good water quality if treatment is improved to accommodate a 46% population increase (332,000 people). The Lower Hudson Area will probably be burdened with deplorable water quality far into the future. The only hope for improvement rests in massive federal and state help to New York City and New Jersey communities and in rapid progress in cleaning up New Jersey industrial sources. (See also W74-09964) (LaPointe-North Carolina)
W74-09958

THE LOWER MISSISSIPPI,
R. Schwartz.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 175-186, 1973. 1 fig, 12 tab, 14 ref.

Descriptors: *Mississippi River, *Water quality, Water quality control, *Water pollution, *Biochemical oxygen demand, Watershed management, Water pollution treatment, Water pollution effects, Projections, Municipal wastes, Industrial wastes, Silt, Capital costs.
Identifiers: *Lower Mississippi River, *1980 water quality projections, St. Louis(Mo.), New Orleans(La).

The Mississippi River, 2,500 miles in length and draining an area of 1.2 million square miles, suffers from natural and manmade pollution. Silt discharges averaging 496,000 tons per day form the natural pollution. Until recently the volume of water in the Mississippi diluted wastes sufficiently to maintain a good water quality; however, proliferating industry and population discharging raw wastes have strained the assimilative capabilities of even this enormous river. Water quality was determined by erecting measuring stations at 6 points in the river: St. Louis, Mo.; Cape Girardeau, Mo.; West Memphis, Ark.; Vicksburg, Miss.; St. Francisville, La.; and New Orleans, La. Using population projections and estimated industrial growth, approximate BOD loads for the year 1980 were determined and compared with levels for 1960 and 1970. These figures show BOD loads well in excess of one billion pounds, with the industrial load slightly greater than 50% of the total. By 1980 loads will be more than 25% higher than

those of 1970. Taste and odor problems with drinking water, especially in the St. Louis area, have generated capital expenditures for sewage treatment facilities since 1963. However, as of 1969 only 30% of the industrial and municipal wastes received adequate treatment before entering the river. Over $1 billion will have to be invested before 1980 in industrial and municipal treatment facilities or severe problems, especially in St. Louis and New Orleans, will result. (See also W74-09964) (LaPointe-North Carolina)
W74-09959

SAVANNAH RIVER,
R. R. French.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 187-210, 1973. 1 fig, 9 tab, 21 ref.

Descriptors: *Water quality, Water quality control, *Biochemical oxygen demand, *Acidic water, Water pollution, Water pollution treatment, Water pollution effects, Shellfish farming, Pulp wastes, Pulp and paper industries, Fishing, Municipal wastes, Industrial wastes, Georgia, South Carolina.
Identifiers: *Savannah River, *1980 water quality projections, *Georgia Water Quality Control Board, Savannah(Ga).

The Savannah River, forming a 310 mile boundary between Ga. and S.C., is subject to severe pollution in the lower 28 miles around the city of Savannah, Ga. Water quality problems are (1) bacteria in mostly raw sewage primarily from the city of Savannah (population equivalent of 147,200), which have caused coliform concentrations as high as 62,000/100 ml and rendered much of the river unfit for bathing recreation; (2) oxygen demanding substances, 78% of which is discharged from the Union Bag-Camp Paper Corporation kraft mill (a population equivalent of 810,000); (3) settleable solids, again originating mainly from the kraft industry; and (4) acid wastes, mainly caused by an American Cyanimid titanium dioxide plant discharging upwards of 690,000 pounds of sulfuric acid per day. These problems have been aggravated to a point where daily minimum dissolved oxygen concentrations have dropped below 2.5 ppm at 75% of the monitoring stations, and 62.5% of the time pH measurements were below 6.5 reaching 4.2 on one occasion of a fishkill. This poor water quality has caused a steady decline in commercial fishing from an average of 22 million pounds for 1918 to 14 million pounds in 1968, a decline of 35.2%. To combat the worsening situation the Lower Savannah River Pollution Conference and the Georgia water quality control board established 85% BOD removal efficiencies for municipal wastes and paper mill wastes, 90% solids removal for industrial wastes, and pH standards for acid wastes (pH greater than 6.0 at any point more than 1,000 feet downstream of the discharge). Target date for completion of the program is Dec. 31, 1972. If the program is carried out on schedule the Savannah River should begin recovery in the 1970's. (See also W74-09964) (LaPointe-North Carolina)
W74-09960

LONG ISLAND WATER,
For primary bibliographic entry see Field 2F.
W74-09961

WATER RECYCLING IN SOUTHERN CALIFORNIA,
For primary bibliographic entry see Field 5D.
W74-09962

THE EFFECTS OF INCREASED PRODUCTION ON THE OCEANS,
F. D. Husson, Jr.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 257-280, 1973. 9 fig, 1 tab, 39 ref.

Descriptors: *Oceans, *Pollutants, *Mercury, *Oil pollution, *DDT, Ships, Offshore platforms, Methane bacteria, Continental shelf, Industrial pollution, Water pollution effects, Water pollution sources, Oceanography, Food chains.
Identifiers: LOT(Load on Top), Methyl mercury, Tankers, Minamata disease.

Most pollution into the oceans from the United States occurs on the Atlantic and Pacific continental shelves where water with large quantities of dissolves oxygen, microorganisms, and plants support a large portion of the bird and fish population. Current knowledge about three dangerous pollutants, petroleum, mercury, and DDT is examined. The major effect of oil pollution is the death of marine life via toxic materials in the oil or asphyxiation from direct coating. Oil finds its way to the sea from numerous sources. The flushing of storage tanks or tankers deposited approximately 2 million tons annually until a new innovation for emptying ballast water, the LOT (Load on Top) procedure, reduced this figure to 500,000 tons. Total employment of LOT is expected to reduce such pollution to negligible amounts. Other sources of oil pollution are merchant ships (500,000 tons per year), offshore wells (100,000 tons per year), refinery operations (300,000 tons per year), and industrial and automotive wastes (500,000 tons per year), not to mention the unknown amount from tanker accidents and offshore well seepage. Mercury can be transformed by the anaerobic methano-basterium omelanski into the poisonous methyl mercury. This compound causes the Minamata Disease which cripples and kills. It is estimated that 10,000 tons of mercury currently enter the oceans, half from man's activities. If this discharge is not eliminated widespread outbreaks of this disease are very possible. The effects of DDT on man are unknown but it is known to inhibit photosynthesis of single celled marine plants and cause abnormally thin shelled eggs in some birds. DDT tends to accumulate in the food chain producing very high concentrations in the higher trophic levels. A conservative estimate of 25,000 metric tons per year now enters the world's oceans. (See also W74-09964) (LaPointe-North Carolina)
W74-09963

SUMMARY OF FINDINGS CONCERNING WATER,
A. J. Van Tassel.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 281-294, 1973. 8 ref.

Descriptors: *Municipal wastes, *Industrial wastes, *Water pollution, *Water pollution sources, *Eutrophication, Nitrates, Phosphates, Biochemical oxygen demand, Lake Erie, Lake Michigan, Mississippi River, Hudson River, Sounds, Bays, Mercury, Oceans, Groundwater, Nutrients, Water supply, Waste water treatment.
Identifiers: *1980 water quality projections, Conclusions, Summary.

Two broad conclusions can be made from studies of Lake Michigan, Lake Erie, Puget Sound, San Francisco Bay, Long Island Sound, the Hudson, Savannah and Lower Mississippi Rivers and the water supplies of Long Island and Southern California as set forth in Chapters 2-13: (1) The rate of growth in the inputs of industrial pollutants in almost all of the waterways was greater than that attributable to population, and (2) the effluent of municipal sewage plants and specifically that portion beginning as household sewage was far and away the most important source of nutrients responsible for the phenomenom of overenrichment or eutrophication. The eutrophication process is well underway in Lake Erie but it is unlikely that any other large bodies of water such as those detailed in this book will reach advanced stages of eutrophication by 1980. It appears that, with the exception of nitrate and phosphate removal, more progress is being made with municipal wastes than industrial wastes; however recent funding assistance programs enacted by various states should lead to rapid progress in the control of industrial effluents. The major casualty has been water recreation, with much shoreline and bathing areas now placed off limits. The only major irreversible damage, due largely to bottom deposition of decaying vegetation capable of exerting massive oxygen demand far into the future, has been incurred by Lake Erie. The general outlook for the nation's waterways in light of likely massive federal funding is bright. (See W74-09953 thru W74-09963) (LaPointe-North Carolina)
W74-09964

THE ECOLOGICAL ASPECT OF FLUORIDE,
National Research Council of Canada, Ottawa (Ontario). Div. of Applied Biology.
J. R. Marier.
Fluoride. 5(2): 92-96. 1972.
Identifiers: *Ecological studies, *Fluorides, *Air-soil-water relationships, Air pollution, Water pollution, Soil contamination, Sulfur dioxide, *Ecosystems.

Examples are given of potential synergisms as they apply to air (between SO2 and fluoride), soil (between fluoride and potassium fluorobate in phosphate fertilizers) and water. Man's propensity to utilize the world's waterways as a catch-all for unwanted materials has led to possible synergism between fluorides and the multitude of waterborne pollutants. Finally, the intake of a pollutant (fluoride) in a biological organism (man) beset by nutritional inadequacy is discussed. These examples are related to air, soil and water pollution and their effect on the ecosystem.—Copyright 1973, Biological Abstracts, Inc.
W74-10002

WATER POLLUTION PREVENTION AND CONTROL--LIST OF TOXIC POLLUTANTS,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10060

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CONSTRUCTION OF MILLSTONE NUCLEAR POWER STATION, UNIT 3, MILLSTONE POINT COMPANY, ET. AL.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Rept. No. Docket 50423-80, $10.60/copy; $1.45 microfiche. Report No Docket 50423-80, February 1974. 401 p, 43 fig, 52 tab, 129 ref, 2 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Connecticut, Bays, Sounds.
Identifiers: *Pressurized water reactors, Niantic Bay, Long Island Sound, *Environmental impact statements.

The proposed Millstone Nuclear Power Station, Unit 3, will employ a pressurized water reactor and will be located in the town of Waterford, Connecticut, on Millstone Point. Cooling will be by a once-through flow of water from Niantic Bay which will be discharged through a Quarry Pond into Long Island Sound. Environmental impacts

are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to issue a construction permit subject to certain stipulated conditions relating to the impact of construction, landscaping techniques for screening, mortality of biota, ecological effects of discharge, surveillance and monitoring of area, and provide a course of action to alleviate irreversible damages. (Houser-ORNL)
W74-10109

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2, TENNESSE VALLEY AUTHORITY.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Docket No. 50438-63; $10.60/copy, $1.45/microfiche. Report No. Docket 50438-63 and 50439-63, June 1974. 336 p, 28 fig, 42 tab, 286 ref, 2 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Tennessee River, Alabama.
Identifiers: *Environmental impact statements, *Pressurized water reactors.

This final environmental statement relates to the issuance of construction permits for the Bellefonte Nuclear Plant Units 1 and 2. The plant will be located on the Tennessee River in Jackson County, Alabama, and will employ two pressurized water reactors cooled by natural-draft cooling towers with water from the Tennessee River. Environmental impacts are assessed and after consideration of alternatives, an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is for a construction permit to be issued subject to the following conditions: (1) an approved one-year sampling program, (2) acceptability of the proposed intake, and (3) certain restraints on use of herbicides. (Houser-ORNL)
W74-10111

RADIOLOGICAL MONITORING PROGRAM, PERIOD COVERING JULY 1, 1972, THROUGH SEPTEMBER 30, 1972, FOR CER GEONUCLEAR CORPORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Santa Fe, N. Mex. Dept. of Nuclear Sciences.
For primary bibliographic entry see Field 5A.
W74-10114

RADIOLOGICAL MONITORING PROGRAM: PERIOD COVERING APRIL 1, 1972, THROUGH JUNE 30, 1972, FOR CER GEONUCLEAR CORPORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Santa Fe, N.Mex. Dept. of Nuclear Sciences.
For primary bibliographic entry see Field 5A.
W74-10115

WATER RESOURCE DEVELOPMENT AND ENVIRONMENT - AN APPROACH TO IMPACT ANALYSIS,
Waterloo Univ. (Ontario). Div. of Environmental Studies.
For primary bibliographic entry see Field 6G.
W74-10122

MATHEMATICAL MODEL OF THE BIOTIC CIRCULATION WITHIN THE LAKE ECOSYSTEM, (IN RUSSIAN),
Akademiya Nauk SSR, Leningrad. Institut Evolyutsionnoi Fiziologii i Biokhimii.
A. A. Umnov.
Gidrobiol Zh Vol 8, No 5, p 5-13, 1972. Illus. English summary.
Identifiers: *Biomass, Biotic circulation, Ecosystems, Lakes, *Mathematical models, Organic matter, *Productivity, Radiation, Solar, Temperature, *Pelagic lakes ecosystem, Phytoplankton, Zooplankton.

A mathematical model of pelagic lake ecosystem is proposed. The state of the ecosystem is determined by phyto- and zooplankton biomass, quantity of dead organic substance, quantity of stable organic substance (in the given model dead organic substance is considered together with bacterioplankton), and quantity of biogenic elements, dissolved in water and taking part in the ecosystem components enumerated above. The role of solar radiation and the thermal regime is considered. The comparison of modeling results with those obtained in the study of the ecosystem of the Mastro lake (USSR) showed good reliability of the model for description of dynamic processes in the lake ecosystems. The model was used for study of the effects of biogenic element concentration on seasonal biomass dynamics and zoo- and phytoplankton productivity.--Copyright 1973, Biological Abstracts, Inc.
W74-10126

BACTERIAL POLLUTION INDICATORS IN THE INTESTINAL TRACT OF FRESHWATER FISH,
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W74-10131

EFFECT OF CONSUMPTION OF SHAVINGS ON HEMATOLOGY OF TURKEY POULTS,
Georgia Univ., Athens. Dept. of Poultry Science.
K. W. Washburn, and O. W. Charles.
Poultry Science, Vol 52, No 3, p 1200-1201, May, 1973. 2 tab, 6 ref.

Descriptors: *Poultry, *Feeds, *Litter, *Diets, *Farm wastes.
Identifiers: Wood shavings, *Hematology, *Turkey poults, Basal, Folid acid, Mean cell volume, Erythrocyte count, Hemoglobin, Macrocytic anemia.

The effect of the consumption of new wood shavings on the hematology of turkey poults was studied. The experimental design consisted of four dietary treatments--(1) basal, (2) basal with wood shavings, (3) basal with added folic acid, and (4) basal with wood shavings and added folic acid. The shavings were fed from a feeder designed for determining individual feed efficiency. The average consumption of litter from those fed the basal diet was 291 grams, while those fed with folic acid added consumed 277 grams of shavings. The hematological parameters measured were: erythrocyto counts, mean cell volume, hemoglobin concentration, and mean cell hemoglobin concentration. No significant differences in the MCV or MCHC of any of the groups indicated that the shavings consumption did not affect the hemotology of turkey poults. (Cameron-East Central)
W74-10136

PSYCHROPHILES IN WASTE TREATMENT,
Toronto Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10176

DEVELOPMENT OF SAMPLE PREPARATION METHODS FOR ANALYSIS OF MARINE ORGANISMS,
Southwest Research Inst., Houston, Tex.
For primary bibliographic entry see Field 5A.
W74-10190

A STUDY OF BDELLOVIBRIO BACTERIOVORUS AS A BIOLOGIC FACTOR OF SELF PURIFICATION OF WATER BODIES, (IN RUSSIAN),
G. I. Sidorenko, G. A. Bagdasar'yan, Yu. G. Talaeva, R. M. Abieva, and Sh. I. Satdykov.
Gig Sanit. Vol 38, No 1, p 11-14, 1973. (English summary).
Identifiers: *Bacteria(Interal), *Bdellovibrio-bacteriovorus, Biological properties, Guinea pigs, Sewage, Streams, Virus, *Self purification, Mice, Toxicity.

Biologic properties of Bdellovibrio bacteriovorus, its distribution in streams and sewage and its role in the water purification process with respect to enteral bacteria and viruses are discussed. Several strains of Bdellovibrio were recovered from sewage and surface waters; their virulence for albino mice and guinea pigs, their toxicity for various lines to tissue cultures and their lytic action for saprophytic and phatogenic bacteria were studied.--Copyright 1973, Biological Abstracts, Inc.
W74-10204

EUTROPHICATION AND RECOVERY IN EXPERIMENTAL LAKES: IMPLICATIONS FOR LAKE MANAGEMENT,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
D. W. Schindler.
Science, Vol 184, No 4139, p 897-899, May 24, 1974. 2 fig, 21 ref.

Descriptors: *Phosphates, *Eutrophication, *Lakes, Experimentation, Canada, Nitrogen, Carbon, Great Lakes, Algae, Water management(Applied), Phytoplankton, Lake basins, Sediments, Water pollution control, *Canada, Detergents.
Identifiers: Phosphorus removal, *Ontario(Canada).

Experimentation on several small lakes in Ontario, Canada tested whether phosphorus alone is responsible for eutrophication problems and how quickly the lakes could recover after phosphorus removal. By adding phosphate, ammonia, and sucrose, rapid eutrophication occurred; but when phosphate additions were discontinued recovery was almost immediate. When two basins of one lake were fertilized with equal amounts of nitrate and sucrose, phosphorus was added to only one and it quickly became eutrophic. The basin with only nitrogen and carbon remained at prefertilization levels. The high affinity of sediments for phosphorus, coupled with these results, indicate that abatement of eutrophication can be expected to follow phosphorus control measures. Reducing phosphorus input should cause a proportional abatement in phytoplankton blooms and other forms of eutrophication. About fifty percent of the phosphorus which comes into the St. Lawrence Great Lakes could be eliminated by banning or greatly reducing detergent phosphates. (Prague-FIRL)
W74-10294

HIGH-LEVEL COPPER FEEDING OF SWINE AND POULTRY AND THE ECOLOGY,
Florida Univ., Gainesville.
For primary bibliographic entry see Field 5B.

W74-10295

CONSEQUENCES OF HIGH NITRATE LEVELS IN FEED AND WATER SUPPLIES,
South Dakota State Univ., Brookings. Dept. of Biochemistry.
R. J. Emerick.
Federation Proceedings, Vol 33, No 5, p 1183-1187, 1974. 77 ref.

Descriptors: *Water supply, *Potable water, *Nitrates, *Nitrites, *Toxicity, Livestock, Feed, Diets, Water quality control, Standards, Public health, *South Dakota, *Farm wastes, *Feeds.

Presently available data and lack of data justify caution with regard to nitrate and nitrite contents of food and water supplies for humans. Animal tests, however, indicate that subacute effects usually have occurred only with levels of nitrate and/or nitrite approaching those of being potentially acutely toxic. Feeds containing less than 0.1 percent NO3-N and waters containing less than 100 ppm NO3-N appear to within a safe range for all classes of livestock. Maximum amounts seem to depend upon the species of animal, the type and quantity of diet, and the time period over which the dose is consumed. (Prague-FIRL)
W74-10296

RENAL TUBULAR MORPHOLOGY IN THE CHANNEL CATFISH (ICTALURUS PUNCTATUS) KIDNEY,
Louisville Univ., Dept. of Anatomy.
M. W. Kendall, and D. E. Hinton.
Journal of the Fisheries Research Board of Canada, Vol 31, No 3, p 346-347, 1974. 6 fig, 8 ref. OWRR A-038-KY (5). 14-31-0001-3217, 14-31-0001-3517.

Descriptors: *Channel catfish, *Water pollution effects.
Identifiers: Renal tubular morphology, Kidney.

Kidneys of 50 channel catfish (Ictalurus punctatus) (25-30 cm long) obtained from a fish hatchery were subjected to light microscopic examination. All renal tubular segments generally found in freshwater teleost kidney were present. These included a ciliated neck segment, bisegmental proximal segment, ciliated intermediate segment, distal segment, and, in addition, collecting ducts. (Grieves-Kentucky)
W74-10318

FURTHER CONTRIBUTION TO THE STUDY OF NITRIFICATION IN THE SEA AND IN A BRACKISH WATER ENVIRONMENT (IN ITALIAN),
Messina Univ. (Italy). Istituto di Idrobiologia.
For primary bibliographic entry see Field 5B.
W74-10341

5D. Waste Treatment Processes

INSTITUTIONAL FACTORS IN THE CREATION OF LOCAL SANITARY DISTRICTS IN WISCONSIN,
Wisconsin Univ., Madison. Land Tenure Center.
H. Felstehausen, and E. Abbott.
Available from the National Technical Information Service as PB-233 787 $4.00 in paper copy, $1.45 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report, 1974. 83 p, 5 figs, 6 tables, 20 ref. OWRR A-042-WIS(1), 14-31-0001-3850.

Descriptors: *Water policy, *Political constraints, *Institutions, Governments, Contracts, *Administration, Legal aspects, Project planning, *Financial feasibility, *Environmental sanitation, Sewage treatment, *Wisconsin, Treatment facilities.
Identifiers: *Lake Koshkonong(Wisc).

The administrative, technical and financial requirements for building a community wastewater collection and treatment facility are presently so complex that local officials and citizens have little control over the scope or quality of service provided or the design and cost of the installation. This is because of extensive technical requirements and high capital costs--both requiring interlocking local, state and federal obligations--plus the sheer number of contracts, approvals, inspections, reviews, requisitions. orders and reminders required to manage a project. The administrative procedures of the Consolidated Koshkonong Sanitary District covering a five year period were located and tabulated to obtain an estimate of the complexity of a community public works undertaking. Research methodology and data handling procedures are described. The process involved 72 identified agencies and organizations and 333 identified officials and technicians. Approximately 5,000 administrative transactions took place. The scope of such an elaborate network of activity was beyond the capacity of the community--local control was replaced by technical control and standardized procedures. Homeowners in the district were surveyed during the final stages of construction to determine how they had participated, how they had learned about the project and if they had complaints.
W74-09811

SUMMARY EVALUATION OF CANDIDATE FLUID-BED SOLIDIFICATION PROCESSES FOR USE IN THE NWCF,
Allied Chemical Corp., Idaho Falls, Idaho. Idaho Chemical Programs Operations Office.
W. A. Freeby, D. W. Rhodes, S. S. Bodner, and D. G. Swink.
Aval: NTIS, Springfield, Va., as Rept. No ICP-1046; $4/copy, $1.45/microfiche. Report No. ICP-1046, April 1974. 30 p, 6 fig, 13 ref.

Descriptors: *Radioactive waste disposal, *Waste treatment, *Nuclear wastes, *Effluents, Chemistry, Chemical reactions, Research and development, Treatment facilities, Heating, Comparative benefits.
Identifiers: Waste management, Air fluidization, Off-gas recycle, Steam fluidization, Calcination.

Air fluidization, off-gas recycle, and steam fluidization are evaluated as process alternatives for the New Waste Calcining Facility. Emphasis was on the capability of each process to reduce radiochemical and chemical emissions to as low as practicable. The disadvantages of steam fluidization and off-gas recycle heavily outweigh any potential advantages. It is recommended that development efforts be concentrated on methods for increasing the efficiency of radionuclide removal from the off-gas based on air fluidization using in-bed combustion heating. (Houser-ORNL)
W74-09829

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Division of Waste Management and Transportation (AEC), Washington, D.C.
Aval: NTIS, Springfield, Va., as Rept. No. WASH-1297; $5.45/copy, $1.45/microfiche. Report No. WASH-1297, May 1974. 105 p, 24 fig, 14 tab, 5 ref, 1 biblio.

Descriptors: *Radioactive waste disposal, *Research and development, Environment, *Environmental effects, *Waste treatment, Geologic formations, Land, Oceans, Seas, Ice, Waste storage, Economics, Degradation(Decomposition), Decay, Stabilization, Equilibrium.
Identifiers: Outer space, Bedded salt, *Hydraulic fracturing, *High-level wastes, Transmutation.

This report is the summary of a comprehensive overview study of potential alternative methods for long-term management of high-level radioactive waste. The study includes a compilation of information relevant to technical feasibility, safety, cost, environmental considerations, policy conflicts, public response and research and development need for: (1) Disposal in terrestrial locations - (a) In geologic settings on land; (b) In the seabed; (c) In ice sheets. (2) Disposal into space. (3) Elimination by transmutation (nuclear transformation of certain waste constituents into nuclides having less long-term toxicity). The study is limited to the management of high-level radioactive waste from nuclear power by variations of these alternatives. (Houser-ORNL)
W74-09839

ICE MELTING EXPERIMENTS--A MODEL STUDY FOR BURIAL OF RADIOACTIVE WASTES,
Sandia Lab., Albuquerque, N.Mex.
H. C. Hardee, and W. N. Sullivan.
Available from NTIS, Springfield, Va, as Rept No SLA-73-0942; $4.00/copy, $1.45 microfiche.Report No SLA-73-0942, January 1974. 37 p, 26 fig.

Descriptors: *Radioactive waste disposal, Management, Research and development, Heating, Heat transfer, Model studies, *Melt water, *Melting, Ice, *Waste treatment.
Identifiers: *Waste burial.

Burial of radioactive wastes in the ground has been suggested as a disposal method. If a buried radioactive source releases heat in excess of a certain minimum value, the ground or rock surrounding the source will eventually melt. The ability to predict the melt rate and the shape of the melted cavity is important in determining whether such materials can be safely disposed of underground. To study the problem, some simple model melting experiments were run with cylindrical and spherical heat sources in ice. Cases were studied in which convective effects were both important and negligible. (Houser-ORNL)
W74-09868

ADDITIONAL HIGH LEVEL WASTE FACILITIES--SAVANNAH RIVER PLANT, AIKEN, SOUTH CAROLINA, (DRAFT ENVIRONMENTAL STATEMENT).
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-09873

MANAGEMENT OF SOLID RADIOACTIVE WASTES,
Atomic Energy Commission, Washington, D.C.
A. F. Kluk, and D. T. Wong.
Chemical Engineering Progress, Vol 70, No 4, p 85-86, April 1974. 1 tab, 6 ref.

Descriptors: *Radioactive waste disposal, *Waste storage, Movement, *Soil contamination, *Water pollution, Leakage, Ion transport, Sorption, Groundwater, Uranium, Plutonium.
Identifiers: *Waste management, *Waste burial, *Burial grounds, Waste handling.

Current waste handling practices, waste treatment, burial ground stabilization programs, pilo experiences are described and cost information provided. Three types are described as follows: (1 Fission product/induced activity (FP/IA) contaminated wastes containing primarily beta gamma emitters. (2) Uranium (U) wastes contaminated with low-hazard alpha emitters. (3 Transuranic (TRU) wastes contaminated wit long-lived, high-hazard, alpha emitters. The firs two categories of solid waste can be safely store in controlled, near-surface, burial areas whe very limited migration of radioactivity occur Monitoring programs have confirmed that esse tially no migration of radioactivity has occurre from currently acceptable burial areas. The pri cipal AEC burial sites are the Los Alamos Scie

tific Laboratory (LASL) in New Mexico, the National Reactor Testing Station (NRTS) in Idaho, the Oak Ridge National Laboratory (ORNL) in Tennessee, the Richland Site in Washington, and the Savannah River Plant (SRP) in South Carolina. A total of about 964,000 cubic meters of solid radioactive waste has been stored at these sites, on 185 hectares of land. Total current annual additions at the principal sites are shown. The bulk of the TRU- contaminated wastes, in terms of both volume and contained radioactivity, is generated at Rocky Flats and shipped to the NRTS for retrievable storage. (Houser-ORNL)
W74-09874

RADIOACTIVITY IN SURFACE AND COASTAL WATERS OF THE BRITISH ISLES, 1971,
Ministry of Agriculture, Fisheries and Food, Lowestoft, (England). Fisheries Radiobiological Lab.
N. T. Mitchell.
Available from NTIS, Springfield, Va., as Rept No FRL-9; $4/copy, $1.45/microfiche. Report No FRL-9, July 1973. 39 p, 1 fig, 27 tab, 41 ref.

Descriptors: *Radioactive waste disposal, *Oceans, *Monitoring, *Aquatic environment, Effluents, Nuclear powerplants, Coasts, Seashores, Water law, Regulations, Standards, Water pollution, Water pollution sources, Fallout, Background radiation, Radioisotopes, Toxicity, Public health.
Identifiers: *United Kingdom(English Channel), *Coastal waters.

The stringent standards set to limit disposal of radioactive waste in the United Kingdom have been maintained, and as a consequence radiation exposure of the public is very low and well within the recommendations of the International Commission on Radiological Protection and dose limits specified in the objectives of UK waste disposal policy. Data presented show that this high standard of compliance continues, and that the exacting requirements of the ICRP recommendations are not merely met but that, in all disposals, radiation exposure of the public is well within the prescribed dose limits and in many instances is very much less. The situation is recorded as it existed at all major sites from which waste is discharged. (Houser-ORNL)
W74-09875

INVESTIGATION AND EVALUATION OF 102-BX TANK LEAK,
Atlantic Richfield Hanford Co., Richland, Wash. Engineering Dept.
For primary bibliographic entry see Field 5B.
W74-09877

RADIOACTIVE WASTE MANAGEMENT INFORMATION: 1972 SUMMARY AND RECORD-TO-DATE.
Idaho Operations Office (AEC), Idaho Falls.
For primary bibliographic entry see Field 5B.
W74-09880

THERMAL DISCHARGES--PROBLEMS AND OPPORTUNITIES,
Division of Biology and Medicine (AEC), Washington, D. C.
R. F. Reitemeier.
Journal of Environmental Quality, Vol 2, No 2, p 178-179, April-June 1973. OWRR A-011-ORE (1)

Descriptors: *Recycling, *Thermal pollution, Industrial wastes, Farm wastes, Municipal wastes, Pollution abatement, Heated water, Cooling water, Waste treatment, Waste disposal, Powerplants.
Identifiers: *Waste heat.

About 50% of the total energy output from fossil fuel plants and 66% of the output from light-water nuclear plants is rejected as heat in the condenser cooling water. The addition of thermal energy to a body of water may, depending on the specific circumstances, alter the local environment, modify ecosystems by effects on temperature-sensitive components, and affect its usability by people as a food and water supply and recreation resource. Some effects may be considered either deleterious or advantageous depending on local conditions, viewpoints, and interests. Such water may help to increase the yield of plant and animal products. Agricultural applications could include: the warming and irrigation of cropland to lengthen the growing season and increase yields; the spraying of fruit trees to reduce injury from cold; the heating and cooling of greenhouses and animal shelters, and the microbiological processing of crop and animal wastes. Potential applications in aquaculture include increased growth rates of finfish and shellfish and the production of algae from vegetable wastes, (Knapp-USGS)
W74-09888

INTEGRATED SYSTEMS FOR UTILIZING WASTE HEAT FROM STEAM ELECTRIC PLANTS,
Oregon State Univ., Corvallis. Dept. of Soil Science.
L. Boersma, and K. A. Rykbost.
Journal of Environmental Quality, Vol 2, No 2, p 179-187, April-June 1973. 6 fig, 9 tab, 29 ref.

Descriptors: *Recycling, *Thermal pollution, Industrial wastes, Farm wastes, Municipal wastes, Pollution abatement, Heated water, Cooling water, Waste treatment, Waste disposal, Powerplants.
Identifiers: *Waste heat.

Multiple use of waste heat and cooling waters from power plants will become an important consideration in the development, siting and certification of these plants. The heat in the cooling water must be considered a resource to be managed for effective use. Pollution problems such as disposal of agricultural and domestic sewage, thermal pollution, and persistent chemicals must be solved in concert, not individually. The ultimate solution to these problems must be found in the development of integrated systems in which resources are recycled. A system of components is proposed to beneficially utilize waste heat, allow multiple use of the cooling water, and achieve a high degree of efficiency in the production of food and fiber without causing polluted streams and soils. The concept fits anticipated trends in agriculture where a higher rate of production per unit area must be achieved for economic reasons and to avoid some of the ecological impact. It allows the wise land-use planning which is rapidly emerging as a major national issue. (Knapp-USGS)
W74-09920

HEAT BUDGET OF COOLING BASINS,
Oregon State Univ., Corvallis. Dept. of Mathematics.
F. T. Lindstrom, and L. Boersma.
Journal of Environmental Quality, Vol 2, No 2, p 197-203, 1973. 4 fig, 5 tab, 2 ref. OWRR B-019-ORE (5).

Descriptors: *Recycling, *Thermal pollution, *Ponds, Heat transfer, Evaporation, Water temperature, Cooling water, Powerplants, Heat budget.
Identifiers: *Waste heat, *Cooling basins.

A system of open water basins is proposed for beneficial use of heated discharges from thermal power stations while at the same time providing a heat sink. Large, shallow compartments are filled with water which is well mixed, while cooling water is pumped through conduits below the basins. They might be used for the production of single-cell protein and fish. Equations were derived for the temperature distribution in the warm water conduit and basins of the system used in conjunction with a 1000-megawatt electric powerplant. The rate of heat loss at the air-water interface may vary widely as a function of windspeed and relative humidity. The surface area of basins required may vary from about 100 ha to over 500 ha. For a constant surface area of the basins the temperature of the cooling water would fluctuate as a result of changing rates of heat loss. It might be difficult to develop commercial uses for a large number of basins. Use of such basins in conjunction with other methods of heat dispersion is therefore suggested. (Knapp-USGS)
W74-09922

ECOLOGICAL MANAGEMENT OF THERMAL DISCHARGES,
California Univ., Berkeley. Dept. of Sanitary Engineering and Public Health.
W. J. Oswald.
Journal of Environmental Quality, Vol 2, No 2, p 203-207, 1973. 2 fig, 1 tab, 13 ref. OWRR A-011-ORE (1).

Descriptors: *Recycling, *Thermal pollution, *Cooling water, *Water reuse, Sewage treatment, Powerplants, Water temperature, Algae, Fermentation, Waste treatment.
Identifiers: Waste heat.

Heat from thermal discharges may improve sewage, animal and vegetable waste treatment processes. With sufficient heat, human, animal, and vegetable wastes may be subject to methane fermentation and algal growth the year around. Algae produced on human and animal waste may be used for livestock feed. The algae produced on vegetable wastes may be processed for human food. Following algae production, the waste water is hygienic and suitable for parks. The rate of anaerobic fermentation in ponds increases 30-fold between 15C and 35C. The most promising algae, Scenedesmus quadricauda, grows best at 20C. Waste decomposition and protein production rates exceed 100 times those normally found in nature. Algae ponds gain and lose heat at rates exceeding those found in ponds free of algae. Calcium and magnesium removal in algal ponds reaches 50% of influent. (Knapp-USGS)
W74-09923

CONCEPTUAL DESIGN OF A FLOOD COMPLEX USING WASTE WARM WATER FOR HEATING,
Oak Ridge National Lab., Tenn.
S. E. Beall.
Journal of Environmental Quality, Vol 2, No 2, p 207-215, 1973. 5 fig, 3 tab, 21 ref.

Descriptors: *Cooling water, *Water reuse, *Thermal pollution, Water pollution control, Recycling, Farms, Crops, Livestock, Waste water treatment, Powerplants.
Identifiers: *Waste heat.

How the heat in waste warm water from electric generating plant condensers can be transferred economically to controlled environments, such as in greenhouses or animal enclosures, and how the heat exchange system could be applied to an intensive food production complex which might be constructed near a power station are discussed. A heat-using complex might consist of enclosures for fish, poultry, swine, and vegetable plants. An abundance of heat in the form of warm water is being produced and discharged as waste from air-conditioning systems, industrial processes, and electric power stations. The temperature of the water is climate dependent but is usually 11.1C or more above natural water temperature and is often 37.8C or warmer even in the coldest months. At plants where cooling towers are installed, the water temperature will be 5.6C to 16.8C warmer than for once-through cooling. (Knapp-USGS)
W74-09924

SIMULATION MODEL TO STUDY THE UTILIZATION OF WASTE HEAT USING A COMBINATION MULTIPLE RESERVOIR AND GREENHOUSE COMPLEX,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
D. R. Price, and R. M. Peart.
Journal of Environmental Quality, Vol 2, No 2, p 216-224, 1973. 9 fig, 5 tab, 5 ref.

Descriptors: *Water reuse, *Heated water, *Cooling water, Recreation, Reservoirs, Farms, Aquiculture, Powerplants, Recycling, Water temperature.
Identifiers: *Waste heat, Heat exchange.

A system was designed to utilize waste heat discharged by the cooling condenser of a steam-electric generating station using systems analysis techniques. Multiple reservoirs are proposed for storage, utilization, and dissipation of the thermal discharge from a 1000-megawatt generating station. One reservoir is used for storage of the warmest water to be used for heating of a greenhouse located adjacent to the reservoir. A second reservoir is included and used for commercial fish production, while another is used for recreational purposes and provides the necessary cooling capacity for summer cooling. Mathematical models describe the heat exchange characteristics of the reservoirs and greenhouse. Operating ranges were determined for the various components of the system. The simulator was used to study the operation of the system throughout a 1-year period. A 2,500-acre recreational lake, up to 500 acres of reservoir for fish production, and up to 350 acres of greenhouse make up a feasible system design. (Knapp-USGS)
W74-09925

WATER RECYCLING IN SOUTHERN CALIFORNIA,
J. Carmichael.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 237-255, 1973. 10 tab, 13 ref, glossary.

Descriptors: *Water supply, *Water reuse, *Water management(Applied), *Water conservation, *Water costs, Water importing, Waste water treatment, Aqueducts, Desalination, Growth rates, Groundwater, *Recycling, Industrial water, Recreation, *California, Colorado River Aqueduct, Irrigation.
Identifiers: *1980 water quality projections.

With rainfall averaging less than 15 inches a year, Southern California must rely heavily on importation of water. The Metropolitan Water District of Southern California (MWD), charged with the development, storage, transportation and vending of water, has been forced to import large quantities of water from the Colorado River, 300 miles away, and from Northern California via the Los Angeles Aqueduct. Importation costs have risen from $15 to $57/acre foot over the past 30 years, and are expected to reach $75/acre foot by 1980. Compounding the problem has been rapid population growth, from 3.5 million in 1940, 8.8 million in 1960 to 11 million in 1969, and projected to reach almost 17 million by 1980 when water demand is expected to be 3.29 million acre feet. Water supply should be ample to meet this growth especially upon completion of the 3 million acre feet Oroville Dam north of Sacramento. Although this will mean increased import costs, the affluent nature of the population minimizes this financial disadvantage. In this area where water recreation is widespread, use could be made of wastewater currently being dumped into the Pacific Ocean. Cost estimates show that such wastewater could be reclaimed for $11.05/acre feet. Recreation, irrigation, and industrial applications are potential uses. Reclamation plants, e.g. Santee County, which reclaims 60 to 80% of imported water for recreational uses, and Whittier Reclamation Plant, which processes 12 MGD for ground water recharge at a cost of $9 per acre foot, demonstrate the economic benefits the region could derive from wastewater reclamation . (See also W74-09964) (LaPointe-North Carolina)
W74-09962

AREAWIDE WASTE TREATMENT MANAGEMENT PLANNING IN THE WASHINGTON METROPOLITAN REGION: 1972 AMENDMENTS TO THE FEDERAL WATER POLLUTION CONTROL ACT, SECTION 208.
Potomac Basin Reporter, Vol 30, no 2, p 1-4, February 1974.

Descriptors: *Interstate rivers, *Impaired water quality, *Waste water treatment, *Project planning, *Water pollution, Water quality control, Water sources, Inter agency cooperation, Federal government, Environment, Water pollution sources, Water pollution control, Water demand, Sewage treatment, Legislation, Discharge, Discharge measurement, Technology, *District of Columbia.

Section 208 of the Federal Water Pollution Control Act was included by Congress to encourage and facilitate regional waste treatment management in major growth areas and to formulate a continuing plan to allow for pollution abatement. Outlined first are the legal requirements which must be met to have the planning process applied to an interstate area and the criteria used in designating these areas. In order to meet Environmental Protection Agency (EPA) planning strategy, plans must be directed toward two primary objectives in general. The first is to achieve the best practicable waste treatment technology for public sources and the best available control technology for non-public sources. The second objective is to eliminate discharges by 1985 if practicable and economically feasible. Planning needs for the Washington metropolitan area are discussed and several recommendations are set forth concerning area waste water treatment. Public participation is felt to be essential as the problems will be extensive and complex. (Sutton-Florida)
W74-09973

PRESIDENT'S MESSAGES: VETO OF H.R. 3298--RURAL WATER AND SEWER GRANTS.
For primary bibliographic entry see Field 6E.
W74-09987

RULES PERTAINING TO STANDARDS FOR SUBSURFACE SEWAGE AND NON-WATER-CARRIED WASTE DISPOSAL.
Oregon State Dept. of Environmental Quality, Portland.
For primary bibliographic entry see Field 5E.
W74-09993

WASTE TREATMENT FUND ALLOCATIONS.
For primary bibliographic entry see Field 6E.
W74-09996

WASTE TREATMENT FUND ALLOCATIONS--LEGISLATIVE HISTORY.
For primary bibliographic entry see Field 6E.
W74-09997

THE UNCERTAIN SEARCH FOR ENVIRONMENTAL POLICY: THE COSTS AND BENEFITS OF CONTROLLING POLLUTION ALONG THE DELAWARE RIVER,
Pennsylvania Univ., Pa.
For primary bibliographic entry see Field 5G.
W74-09999

PRETREATMENT STANDARDS FOR SEWERAGE.
For primary bibliographic entry see Field 6E.
W74-10006

HIGH-RATE FILTRATION,
CH2M/Hill, Corvallis, Oreg.
A. H. Rice.
Journal of the American Water Works Association, Vol 66, No 4, p 258-261, April, 1974.

Descriptors: *Filtration, *Clarification, *Water quality, *Filters, Water temperature, Effluents, Suspended solids, Flocculation, Head loss, Silica, Design criteria, Water treatment, *Waste water treatment.
Identifiers: Polyacrylamides, High rate filtration, Floc penetration, Anthracite coal, Filter-media.

High filtration rates for improved filtered-water clarity are a trend in industry. Practices of filtration vary widely because of a number of variables in design and mechanisms of filters. Filters become steadily finer as materials deposit and head loss increases exponentially. By being sure that filter-media grain size is too large to permit straining to occur, this is prevented; and removal is therefore by chance adhesion of the relatively small suspended particles onto the relatively large surface of the filter media or previously deposited material. Flow rate, kind and amount of suspended solids, desired effluent quality, and water temperature are the major variables in filtration. Depth of filter and media size also influence head-loss, floc penetration, and water quality. The majority of United States water-filter plants use a sand filter. Dual media filters with anthracite coal and three-media filters with garnet or ilmenite are described. In the use of multi-media filtration, materials with different specific gravities are necessary, and the materials must be relatively inexpensive and durable under filter conditions. An additional problem in filtration, seasonal variation of floc, has been solved. Polyacrylamides and activated silica as floc-strengthening agents are a necessary part of new methods of high-rate filtration. (Prague-FIRL)
W74-10015

FACTORS IN REGIONAL ASSESSMENT OF WASTEWATER REUSE,
Camp, Dresser and McKee, Boston, Mass.
D. R. Horsefield.
Journal of the American Water Works Association, Vol 66, No 4, p 238-239, April, 1974.

Descriptors: *Water reuse, *Waste water disposal, *Recycling, *Cooling water, Water quality, Standards, Water supply, Planning, Costs, Domestic water, Groundwater, Recharge, Agriculture, Recreation, Industrial wastes, Diseases, Electricity, Effluents, Power plants, Texas, Reclamation, *Regional analysis.
Identifiers: *Texas Water Plan.

Feasibility of waste water reuse in any regio should be evaluated on the basis of specific loca conditions of quality, quantity, and economics The North Central Texas Council of Government assessed their area by asking what the needs fo present and future supplemental water supplie were, what the best method of reuse for the regio might be, what the potential markets for renovate waste water were, and what water quality criter for beneficial uses needed to be. The Texas Wat Plan is long range and takes into account metho of water reuse aside from domestic reuse twen years from now. These include groundwat recharge, agricultural irrigation, recreation lakes, industrial process water, and cooling wate Disease prevention is foremost as a considerati The only currently marketable method of the fi above is cooling water for steam-electric pow plants. If these operate at capacity, for 1990, wi recycled cooling water (high quality effluent), t make-up requirement could be reduced by up to fold. Advantages of waste water reclamation are economics and in long-range planning. (Pragu FIRL)
W74-10016

SELECTING MIXERS FOR TREATMENT OPERATIONS,
Philadelphia Mixers Corp., Pa.
R. L. Winter.
Journal of the American Water Works Association, Vol 66, No 4, p 262-264, April, 1974. 5 fig.

Descriptors: *Mixing, *Water treatment, *Waste water treatment, *Design criteria, Costs, Liquids, Solids, Biological treatment, Tertiary treatment, Industrial wastes, Lime, Waste water treatment, Separation techniques, Equipment, Hydrogen ion concentration.
Identifiers: *Mixers.

Designs for mixers in water treatment and waste treatment vary according to particular applications but basic operating principles are the same. Waste treatment is broken down into primary, secondary, and tertiary treatment. Primary treatment removes solids with the aid of some type of liquid-solid separation mechanism. In secondary treatment, a biochemical process is usually involved to get rid of undesirable bacteria and other imputities. In tertiary treatment, this water is converted to a reusable state. Mixers are used for each phase, and vary in speed as well as size. An additional application of mixers in industrial operations is in automatic control of pH value of waste water by a response valve which allows control of the flow of lime. Costs and flexibility determine the type mixer for any application. Factors for consideration are speed changes, power changes, impeller changes, gear-reducer load ratings, and agitator and support bearings. (Prague-FIRL)
W74-10017

SHEAR-RESISTANT FLEXIBLE PIPE JUNCTION FOR SEWERAGE AND DRAINAGE.
Hoechst Australia Ltd., Melbourne.
For primary bibliographic entry see Field 8A.
W74-10019

SLUDGE BLANKET FOR WATER TREATMENT.
Standard Telephones and Cables Pty. Ltd., Alexandria (Australia).
Australian Patent 445,755. Issued November 4, 1969. Official Journal of Patents, Trade Marks and Designs, Vol 44, No 7, February 28, 1974.

Descriptors: *Sludge, *Water treatment, *Patents, Liquids, Waste water treatment.
Identifiers: *Sludge blanket, Floc-suspension.

Water treatment is achieved using chemical agglomeration of impurities followed by separation of the chemically formed floc-suspension by filtration. A fully fluidized sludge blanket is comprised of sludge concentrator compartment, overflow openings, and walls of substantially cylindrical vessels arranged horizontally. A slot along the whole length of the lower part of the sludge blanket connects to a distribution channel for the treated liquid. (Prague-FIRL)
W74-10020

CIRCULATION SYSTEM WATER PURIFICATION - BY TREATMENT WITH AMMONIA SUBSEQUENTLY RECOVERED BY MEANS OF ION EXCHANGE RESIN,
A. M. Koganovskii, V. D. Semenyuk, and G. S. Chepurnaya.
Soviet Patent 365,326. Issued June 6, 1973. Soviet Inventions Illustrated, Section J-Chemical, (U49), January 10, 1974.

Descriptors: *Waste water treatment, *Recycling, Recirculated water, *Water reuse, *Ion exchange, *Resins, Filtration, Ammonia, Municipal wastes, *Patents.

The purification of a circulation water system by treatment with ammonia and its recovery by an ion exchange resin are described. The process is simpler and more economical than the conventional treatment with alkalis, which results in periodical discharge of water when the content of chemicals exceeds the admissible level (thus chemicals are lost). Ammonia is recovered in the H-form on cationic filters which are regenerated by washing with nitric acid. Water is then neutralized by passing through an OH-ionite filter, regenerated with ammonia water. The filter washing solutions can be used as liquid fertilizers. For example, water loss in a recirculation system is replenished with river water, which is treated with ammonia in an amount of 40 milligrams/liter milligram equivalent of the temporary hardness. The pH rises to 9.5-10, and calcium carbonate, magnesium hydroxide, and ferric hydroxide are precipitated. Ammonia is recovered on a H-cationite filter. A part of the water that passed through this filter (1/3-1/5) is directed to an OH-anionite filter. The regeneration of both filters is carried out with 25 percent nitric acid or 10 percent ammonia solution, respectively. (Merritt-FIRL)
W74-10021

SEWAGE TREATMENT PLANT - USING COMBINED FLOCCULATION AND AERATION.
IMB Netherlands, Amsterdam.
Netherlands Patent 7,217,163. Issued December 3, 1973. Netherlands Patents, Food, Disinfectants, Detergents (451), p 1, January 24, 1974.

Descriptors: *Sewage, *Waste water treatment, *Flocculation, *Aeration, Treatment methods, Recycling, *Patents.

A sewage treatment plant is described which combines flocculation and aeration. The raw sewage and a flocculating agent are fed into the inlet chamber of the plant together with some recycled liquid and a bleed fraction from the main compressed air line. The resultant mixture overflows a weir and goes into a preseparation and flocculation tank with an internal convection circuit. On the surface is a floating plastic inlet nozzle and manifold assembly which is connected to the suction side of a pump. It feeds the extracted liquid into a pressure vessel whose lower part is a set of air distributor nozzles fed by the main compressed air line. The resultant air-saturated liquid is expelled by the pressure build up into sets of distributor nozzles in the final separation tank of the plant. The air raises the flakes to the surface where they are trapped and the clear effluent is drained via a baffled compartment from the base of the separator tank. The nozzles for the super-aerated liquid are in two tiers, those above having higher mass flow than those below. There is a relatively high treatment capacity and high purification efficiency in terms of extraction of those dissolved impurities which are bonded by the flocculation agent. (Merritt-FIRL)
W74-10022

HYDRAULIC SEWER PIPE LINE CLEANER,
Conco Inc., Mendota, Ill.
For primary bibliographic entry see Field 8C.
W74-10023

METHOD AND MEANS OF CONTROLLING DEPOSITION OF PARTICLES IN A LIQUID,
D. A. Woodhouse.
Australian Patent 445,189. Issued February 14, 1974. Official Journal of Patents, Trade Marks, and Designs, Vol 44, No 5, p 483, February 14, 1974.

Descriptors: *Liquids, *Coagulation, *Patents, Flow, Zeta potential, Electrochemistry, Australia, *Waste water treatment, Deposition(Sediments).
Identifiers: *Electromagnetic force, Deposits.

A method of treating a liquid to promote coagulation of particles in the liquid is described. A self-induced e.m.f. is produced at a section of a supply conduit through which the liquid flows. It is effective to alter the Zeta potential of particles and ions present in the liquid contained in or passing through that section of the conduit. (Merritt-FIRL)
W74-10024

METHOD AND FILTER MEDIA FOR THE TREATMENT OF SEWAGE AND WASTE WATERS,
J. M. Choun.
Canadian Patent 938,226. Issued December 11, 1973. Patents/Brevets, p 3923, December 11, 1973.

Descriptors: Sewage, *Waste water treatment, *Filtration, *Aerobic treatment, Filters, *Patents.

A method and filter media for the aerobic treatment of sewage and wastewaters using a trickle filter are described. The filter media consists of thin wall capsules or shells of polymeric resin of sufficient regidity as to be self-supporting in the filter bed. The shells are reticulated by comparatively large diameter openings which permit a trickling flow of liquid and a free circulation of air both about and within the capsules. The structural arrangement of the filter media permits the filtering process to include the steps of forming both small puddles and unwetted portions throughout the filter media. A small amount of anaerobic activity apparently occurs within the puddles, and psychoda flies, finding dry perching places, live within the filter media itself. These combined factors result in a more effective filter media and better performance by the media. (Merritt-FIRL)
W74-10025

DRAINAGE GRATING,
For primary bibliographic entry see Field 8A.
W74-10026

PROCESS FOR REMOVING PROTEIN FROM WASTE EFFLUENT.
Tasman Vaccine Lab., Melbourne, (Australia).
Australian Patent 445,712. Issued July 14, 1969. Official Journal of Patents, Trade Marks and Designs, Vol 44, No 7, p 682. February 28, 1974.

Descriptors: *Patents, *Effluent, *Proteins, Wastes, Waste water treatment, Ion exchange, Liquids.
Identifiers: Hydroxyl groups.

A substantially protein-free liquid is recovered after passing waste effluent through a bed or beds of ion exchange material, and regenerating the ion exchange material for future use. These ion exchange groups are cross-linked by the residues of a cross-linking agent which is bifunctional and capable of reacting with two hydroxyl groups to form covalent bonds. (Prague-FIRL)
W74-10027

FILTER AND SLURRY METERING SYSTEM,
Stauffer Chemical Co., N.Y.
J. A. King, and D. R. Maxam.
Canadian Patent 944,590. Issued April 2, 1974. Patents/Brevets, Vol 102, No 14, p 1165, April, 1974.

Descriptors: *Filters, *Slurries, *Patents, *Measurement, Circulation, Weight, *Canada, *Waste water treatment.

A system for measuring the solids content on a dry basis in a filter aid water slurry and pumping the filter aid back into a filter is described. The system circulates the filter aid water slurry through a density gauge and flow meter to measure the dry weight of solids. Then, the slurry is pumped back into the filter for reuse. (Merritt-FIRL)
W74-10028

FILTER FOR PURIFICATION OF EFFLUENTS COMPRISING PLANTS EMBEDDED IN GRAVEL/SAND FILTER BED.
German Patent 1484-841. Issued February 21, 1974. German Patents Abstracts, Vol 5, No 9, p 1, April, 1974.

Descriptors: *Filters, *Effluents, *Plant groupings, *Patents, *Bulrushes, Methodology, Waste water treatment, Filtration.

Plants are embedded into the filter medium, that being either gravel or sand devoid of nutrients, in such a way that their roots extend parallel to the direction of flow of the effluents through the filter medium. An aerator supplies fine bubbles below some of the roots. The preferred plants are plaited bulrushes. (Sandoski-FIRL)
W74-10031

DESIGN AND PERFORMANCE OF CHLORINE CONTACT TANKS,
Illinois State Water Survey, Urbana.
V. Kothandaraman, and R. L. Evans.
Illinois Department of Registration and Education, Circular No 119, 1974. 36 p, 13 fig, 19 tab, 17 ref.

Descriptors: Hydraulics, *Chlorine, *Model studies, Flow characteristics, Air, Solids, *Design criteria, Bacteria, Water purification, *Waste water treatment, *Water treatment.
Identifiers: *Chlorine contact tanks, Split chlorination, Solids accumulation, Baffled contact tanks.

Most existing chlorine contact tanks suffer from serious drawbacks of dead spaces, short circuiting, and solids accumulations. These putrefy and exert undue chlorine demand. Hydraulic model studies of chlorine contact tanks indicate that air agitated, baffled contact units have better flow characteristics than just baffled units or air agitated contact tanks without baffles. Air agitation does not result in a loss of total chlorine residuals, and it improves the bactericidal efficiency of chlorination. Air agitation eliminates the problems caused by solids accumulation in the contact units. Split chlorination does not appear to be an advantageous modification in chlorination practice. (Prague-FIRL)
W74-10035

SOLUBILITIES OF CALCIUM SULFATE DIHYDRATE AT 25C IN BRACKISH WATERS AND THEIR CONCENTRATES: EFFECT OF CALGON ADDITIVE AND PREDICTIONS FOR REVERSE OSMOSIS PROCESSES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 3A.
W74-10036

DEVELOPMENT OF A MONITOR FOR RECYCLE OF WASTE WATER,
Amicon Corp., Lexington, Mass.
H. Scharen, and T. W. Mix.
Available from the National Technical Information Service as AD771 975, $4.25 in paper copy, $1.45 in microfiche. Annual Report for period of December 1, 1972 to August 15, 1973, November, 1973. 42 p, 11 fig, 4 ref. DADA 17-72-C-2169.

Descriptors: *Monitoring, *Reverse osmosis, *Recycling, Flux, Membranes, Water purification, Spectrophotometry, Research, Tracers, Dyes, Salts, *Waste water treatment, *Filtration.
Identifiers: *Ozonation, *Ultrafiltration, Dichromate oxidation, Dichromates.

In a pilot eight-month study, a Reverse Osmosis (RO) unit was set up and RO membranes were tested for flux and salt rejection. Ultrafiltration and ozonation studies were performed on various dyes to check their suitability as candidate tracer material for the various purification steps of the recycle water. Efforts were undertaken to decide whether each step must be monitored individually. Efforts were concentrated on a feasibility study of dichromate oxidation in acid mediums as a monitoring technique, using a spectrophotometer to study the reaction between organic impurities in water and dichromate. (Prague-FIRL)
W74-10037

SELECTED ABSTRACTS FOR INSTRUMENTATION AND AUTOMATION OF WASTEWATER FACILITIES,
Raytheon Co, Portsmouth, R.I. Environmental Systems Center.
A. E. Molvar, and J. F. Roesler.
Available from the National Technical Information Service as PB-225 520, $7.00 in paper copy, $1.45 in microfiche. 1973. 309 p. EPA 17110.

Descriptors: *Instrumentation, *Automation, *Publications, Costs, Waste water treatment, Storm water, Flow measurements, Sanitary engineering, Control, *Treatment facilities, *Abstracts.

A collection of abstracts summarizing technical articles related to the instrumentation and automation of waste water treatment plants was developed. This literature search encompassed most recognized environmental instrument and automatic control periodicals, symposium series, and conference proceedings published from 1967 to 1973. In addition, scientific and engineering abstracting publications were researched for pertinent literature. Approximately 600 abstracts collected during this investigation are classified according to the following four categories: Instruments, Control Experiences and Strategies, Costs, and Support Material. These categories are further refined into numerous subcategories. Each entry contains a title, author, bibliographic citation, abstract, and keywords. An author index and source list are also included. (Prague-FIRL)
W74-10038

BASE CIVIL ENGINEER SANITARY LABORATORY,
Air Force Academy, Colorado Springs, Colo.
S. E. Schultz.
Available from the National Technical Information Service as AD772 686, $4.00 in paper copy, $1.45 in microfiche. Final Report, December, 1973. 105 p, 4 fig, 49 tab.

Descriptors: *Waste water treatment, *Laboratory tests, *Treatment facilities, Laboratory equipment, Reviews, Standards, *Colorado.
Identifiers: Reagents, Floor plans, Apparatus, U.S. Air Force Academy.

A number of standard water and waste water testing laboratories are described. These are equipped to support Base Civil Engineering personnel in operating treatment plants. An itemized list of equipment, apparatus, and reagents for each test to be conducted is given. Included are floor plan drawings of the laboratories and an identification of utility services which are required for operation. (Prague-FIRL)
W74-10039

THE PUDSEY PROJECT,
R. P. Harker, G. Hurst, and B. M. Rock.
Civil Engineering, Vol 44, No 4 p 30-31, April, 1974.

Descriptors: *Water quality, *Effluents, *Sewage, *Textiles, Research and development, Water pollution control, Water quality standards, Suspended solids, Turbidity, Filtration, Chlorination, Mills, *Water reuse.
Identifiers: Pudsey Works(England/U.K.), *Wool textile industry, Textile mills, *United Kingdom.

Research and development by the Wool Industry Research Association (WIRA) and the water pollution control department of the Pudsey Borough Council has been carried out to see how sewage effluent might be used for wet processes. It was generally thought that a very high quality of water was required for wool textile industry wet processes. However, the data collected indicate that sewage works effluent agrees with the specifications--iron 0.5 mg/liter, manganese 0.1 mg/liter, total hardness of 50 to 100 mg/liter as CaCO3. They do not agree reasonably with turbidity, color, and suspended solids. However, after suitable filtration and chlorination it seemed that the effluent waters would meet these standards. From laboratory and mill based trials, it was concluded that the wet processes at the mill could be carried out using effluent from Pudsey Works. (Prague-FIRL)
W74-10041

NUTRIENT CONTROL IN SEWAGE LAGOONS,
Pollutech Pollution Advisory Services Ltd., Oakville, (Ontario).
Research Program for the Abatement of Municipal Pollution Within the Provisions of the Canada-Ontario Agreement on Great Lakes Water Quality, Research Report No 8, 56 p, 23 fig, 2 tab, 7 ref.

Descriptors: *Phosphates, *Sewage lagoons, Laboratory tests, Model studies, Computers, Solids, Liquids, Dissolved oxygen, Phosphorus, Effluents, Chemical control, Carbon, *Canada, Hydrogen ion concentration, *Waste water treatment.
Identifiers: Soluble phosphates, Bottom deposits, Chemical dosages, Ontario(Canada).

The effects and behavior of precipitated phosphates in sewage laggons were studied. Two techniques were used to simulate lagoon conditions to obtain data for the possible long-term distribution of phosphates between the solid and liquid phases in treatment lagoons. One method utilized laboratory-scale simulators operated under closely controlled conditions of temperature and loading. In the second method, a computational procedure was developed, involving the use of a computer model written to simulate the removal of soluble phosphates by precipitation with alum. Full-scale lagoons were used for comparative purposes in the first method. Two laboratory units were seeded from bottom deposits, and filled with lagoon effluent taken from the full-scale lagoons. In each case one lagoon was operated as a control, and the other received chemical dosing. In both the full-scale control lagoon and the laboratory control lagoon, during periods of low dissolved oxygen, both phosphorus and carbon were resolubilized from bottom deposits. The phosphorus resolubilization rate was much less dependent on temperature and lagoon maturity than carbon. The laboratory simulators indicated that more extensive phosphorus resolubilization would occur at higher temperatures; pH was not a governing factor for phosphorus resolubilization. (Prague-FIRL)
W74-10043

TO ESTABLISH VIABLE METHODS OF MAINTAINING WASTE TREATMENT FACILITY EFFICIENCIES WITH REFERENCE TO FLOW VARIATIONS,
Maclaren, James F. Ltd., Willowdale (Ontario).
Research Program for the Abatement of Municipal Pollution Within the Provisions of the Canada-Ontario Agreement on Great Lakes Water Quality, Research Report No 11, 1974. 91 p, 34 fig, 13 ref.

Descriptors: *Sewage treatment, *Flow, *Waste water treatment, *Treatment facilities, Design, Hydraulics, Costs, Methodology, Data Efficiency, *Canada.
Identifiers: Flow equalization, Sewage flow, Process operations, Ontario(Canada).

Equalization of sewage flow variations has several major benefits: reduced unit size requirements f

treatment facilities; more stablized process operations; and, reduced bypassing of the incoming flow. Limited attention has been given to these aspects. The first step was to develop a methodology for sizing equalization facilities taking into account diurnal, daily and seasonal variations in sewage flow. Actual flow data from a treatment plant having a 40-50 MIGD (million imperial gallons per day) capacity were used in development of methodology. The significance of flow equalization to the design of treatment facilities was developed by revising design criteria for sizing treatment facilities. These were established using basic design concepts incorporating modified hydraulic characteristics of equalized sewage flow into the design. The methodology was then applied to sizing treatment facilities for a plant of similar size to the selected plant operating under equalized and varying flow conditions. It was found that a saving in capital costs would be realized by installing equalization facilities. In conclusion, the study verified the need for further investigation into the potential benefits of flow equalization. (Prague-FIRL)
W74-10046

REUSE AND RECYCLE OF WATER IN INDUSTRY,
Bostock, Hill and Ribgy Birmingham, (England).
C. J. Appleyard, and A. B. Mukerji.
Chemistry and Industry, No 6, p 240-246, March 16, 1971. 2 tab, 10 ref.

Descriptors: *Water reuse, *Recycling, *Industries, *Treatment facilities, Food processing industry, Textiles, Dissolved solids, Costs, *Waste water treatment, *Industrial water.
Identifiers: Phase separation, Organic material removal, Electronic industry, Television tubes, Steel works.

Water reuse of recycle both reduces the requirement of raw water and reduces the volume of effluent which has to be subsequently disposed of as well as the size of any treatment plant required. In industry, in order to utilize water reuse, a balance must be drawn up followed by a detailed survey to indicate: whether the effluents are suitable for reuse or recycle with or without treatment; whether water is being used unnecessarily; the minimum, average, and maximum quantity of water required; frequency of use; nature and amount of contamination; and nature of treatments required. Industries discussed include the food industry, the electronic industry, the semiconductor industry, the manufacture of television tubes, the textile industries, cooling water reuse, steel works. Problems related specifically to each are described. Treatments included removal of particulate matter or phase separation, removal of dissolved inorganic ions, and removal of soluble organic material. It was concluded that in almost every industry recycle or reuse of water must be accommodated in the future for both economics and conservation. (Prague-FIRL)
W74-10051

EPA'S RUCKELSHAUS: 'FROM CARELESS INDIFFERENCE TO REMEDIAL ACTION',
Environmental Protection Agency, Washington, D.C.
W. D. Ruckelshaus.
Journal of the Water Pollution Control Federation, Vol 44, No 4, p 523-530, April 1972. 1 photo.

Descriptors: *Water pollution, *Treatment facilities, *Waste water treatment, *Water pollution control, *Legislation, Permits, Water pollution sources, Water pollution treatment, Sewage treatment, Sewage sludge, Industrial wastes, Municipal wastes, Environmental sanitation, Detergents, River basin development, Planning, Law enforcement, Government finance, Legal aspects.
Identifiers: Environmental Protection Agency(EPA).

EPA action on water pollution and waste water treatment plants is described. We have taken concrete remedial action to restore our heritage of clean, fresh, free-flowing waterways. The permit programs for industrial discharges, and over 180 enforcement actions against major municipal and industrial polluters are described. A restructuring of the nation's waste treatment capacity is predicted. The habit of building one system at a time must change and regional and river basin planning is essential. The proposal for permitting municipalities planning construction of waste treatment facilities to award turnkey contracts is discussed. Under this system, a single organization would be responsible for all aspects of a construction project. EPA has placed new emphasis on manpower and training. The EPA is drawing together all the elements needed to produce well-trained water pollution control personnel. (Craig-Florida)
W74-10072

COMMUNITY ADOPTION OF WATER REUSE SYSTEMS IN THE UNITED STATES,
Clark Univ., Worcester, Mass.
R. E. Kasperson, D. Baumann, D. Dworkin, D. McCauley, and J. Reynolds.
Available from the National Technical Information Service as PB-234 030, $7.25 in paper copy, $1.45 in microfiche. Office of Water Resources Research Completion Report, 1974. 313 p, 7 fig, 19 tab, append. OWRR C-2178 (3379)(1). Report, 7/1/70-3/31/74.

Descriptors: *Water reuse, Reclaimed water, Social aspects, Cities, Behavior, Attitudes, *Economic feasibility, Decision making, Model studies, *Management, *Adoption of practices, *Municipal water, Community development, Urban sociology.
Identifiers: Renovated waste water, *Public attitudes.

Study objectives were: (a) to identify the major social obstacles to wider community adoption of water reuse systems and to measure the effects of perceptions and attitudes; (b) to determine the origins of these obstacles in diverse community and managerial settings and to consider opportunities designed to encourage the consideration of the use of renovated wastewater; and (c) to delineate the economic parameters of the decision to reuse water and to formulate a model designed to evaluate feasibility. Researchers visited eight cities during 1970 and 1971 where some 625 interviews and 45 lengthier interviews with managers resulted. The studies also created a data inventory of the character of the effluent treatment processes, water needs and supply characteristics, and costs and time sequence information. The results were then submitted to computer analysis. These analyses produced the major study results which include a comparative profile of water reuse in six American cities, an elaborate model which treats reuse adoption by the managerial system as a form of adaptation, an exploration of the economic parameters of water reuse, an evaluation of myth and reality in our understanding of public attitudes toward the use of renovated wastewater, and a detailed examination of the public response to drinking reclaimed water.
W74-10081

REMOVAL OF OIL FROM AQUEOUS WASTES BY FLOTATION,
California Univ., Berkeley. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5G.
W74-10082

COMMERCIAL HIGH-LEVEL WASTE PROJECTIONS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5G.
W74-10113

SAVANNAH RIVER LABORATORY, WASTE MANAGEMENT QUARTERLY REPORT, JANUARY-MARCH 1973.
Du Pont de Nemours (E.I.) and Co., Aiken, S. C. Savannah River Lab.
Available from NTIS, Springfield, Va., as Rept. No. DPST-73-125-1; $4.00/copy, $1.45/microfiche. Report No. DPST-73-125-1, 1973. 38 p, 17 fig, 6 tab, 15 ref.

Descriptors: *Radioactive waste disposal, *Management, *Waste storage, *Leakage, *Corrosion, Corrosion control, Safety, Evaluation, Water pollution, Water pollution sources, Monitoring, Observation wells, Deep wells, Drawdown, Water wells, Recharge wells, Aquifers, Bedrock.
Identifiers: *Retrievable surface storage, *Solidification, *Calcination.

Long-term management of high activity waste is currently planned to comprise solidification and storage in an engineered, near-surface facility above the water table, and located on the plantsite. Evaluation study included solid waste forms, solidification processes, and their applicability to plant waste. Laboratory corrosion studies were begun to determine the causes of leaks attributed to corrosion damage in mild steel tanks used to store high activity wastes from separations processes at the Savannah River Plant. Two water-level recovery tests were made in Well DRB 11 in the Triassic basin after drilling stopped at 3320 feet. A Mossbauer technique was developed and used for qualitative determination of iron-containing mineral phases in the saprolite layer between the overlying Tuscaloosa aquifer and the crystalline bedrock beneath the plantsite. (Houser-ORNL)
W74-10116

RADIOACTIVE SOLID WASTE DISPOSAL INTO THE OCEANS: IMPLICATIONS AND PERSPECTIVES,
Comitato Nazionale per l'Energia Nucleare, Rome (Italy).
For primary bibliographic entry see Field 5E.
W74-10117

OVERVIEW OF HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT STUDIES.
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
Available from NTIS, Springfield, Va., as Rept No BNWL-1758; $4/copy, $1.45/microfiche. Report No BNWL-1758, August 1973. 46 p, 25 fig, 1 tab.

Descriptors: *Radioactive waste disposal, *Nuclear wastes, Technology, *Research and development, *Methodology, Storage, Geology, Salt, Oceans, Ice, Safety, Evaluation.
Identifiers: Waste fixation, *Waste management, Land burial, Hydraulic fracturing, Geologic formations, Transmutation, Seabed disposal, Ice sheet disposal.

Technology related to the management of high-level radioactive waste is being developed at several government laboratories. Two of the major areas being investigated by Battelle at the Pacific Northwest Laboratory (PNL) are: Waste Fixation -- Conversion of the waste to a stable solid form. Advanced Disposal Concepts -- A systematic evaluation of candidate disposal methods. An added safety factor to most means of waste storage (temporary and retrievable) and waste disposal (permanent, and nonretrievable or possibly retrievable) could be provided by waste fixation. Technology is being developed through the pilot plant scale to incorporate the high-level waste into extremely immobile solid forms. Alternative concepts for ultimate disposal of solidified high-level radioactive wastes are being evaluated on a systematic basis. The evaluation includes consideration of technical feasibility, safety, cost,

environmental impact, policy conflicts, public acceptance and research and development needs. Waste disposal concepts under evaluation include geologic, seabed, ice sheet and extraterrestrial disposal as well as transmutation (transforming by irradiating certain waste constituents into elements having more desirable waste management characteristics). (Houser-ORNL)
W74-10124

CONFINEMENT SYSTEM OFFERS NEW SOLUTIONS TO OLD PROBLEMS,
T. Zurowski.
Feedlot Management, Vol 15, No 9, p 44, 48, September, 1973, 2 fig.

Descriptors: *Farm wastes, *Feed lots, *Confinement pens, *Livestock, Farm management, *Waste storage, *Wastewater treatment, Costs.
Identifiers: Concrete holding pond, Barn cleaners, Hot water heating systems, Slatted floors, Pollution.

A workable confinement system has been built in Northfield, Minnesota. The system is composed of a confinement barn, a concrete holding pond, barn cleaners, and a special hot water heating system in the floor of the unit which helps make the entire system functional. The barn is divided into 8 pens. Each pen has a capacity for 75 animals with approximately 20 sq. ft. of space per animal. The floor is partially slatted. A steeply sloped pit is located beneath the slatted area. Barn cleaners are at the bottom of the pit. The cleaners dump the manure into a concrete holding pond. To prevent manure freeze up, hot water heating lines are placed beneath the solid portions of the floor. The system, not including cleaners, feed storage, feeders, and waterers, cost $74,000. The advantages of this system are that it is pollution proof and it is easy to operate. Because it has zero discharge from its pens, this operation will comply when any new pollution control regulations are developed. (Cameron-East Central)
W74-10128

ARIZONA OPERATORS QUESTION FLUME CONCEPT,
P. D. Andre.
Beef, Vol 10, No 6, p 44, February, 1974, 2 fig.

Descriptors: *Waste disposal, *Flumes, *Feed lots, *Cattle, *Farm wastes, Design, Ammonia, Costs, *Arizona, Waste treatment.
Identifiers: *Waste management, Slotted floors, Flushing.

A flume structure was tested in Arizona. The test building was 24 feet wide and 400 feet long with two 12 inch flumes on 12 foot centers. Various textures were used on the floor surface, and the slope of the flumes ranged from 1/2 inch to 1 inch per foot. During the feeding test, 80 head of cattle were placed in each pen. An equal number of comparable cattle were put in an adjacent slotted floor building and given the same amount of space per head. Rations were identical. The following problems arose with use of the flume structure: (1) insufficient cleaning, (2) difficulty of the men in maintaining their balance, (3) the need for daily flushing, (4) the need for the cattle to have shade, (5) lack of ammonia control, and (6) the difficulty of cattle in getting their footing. There was no significant difference in the performance of the groups of cattle and no significant difference in the operating costs of the two operations. (Cartmell-East Central)
W74-10130

NO ODOR AND NO POLLUTION,
Soil Conservation Service, Hondo, Tex.
E. L. Abbott.
Soil Conservation, Vol 39, No 2, p 8-9, September, 1973. 2 fig.

Descriptors: *Odor, *Recycling, *Farm wastes, *Feed lots, Irrigation, Air pollution, Water pollution, *Texas, Bermudagrass, *Waste treatment, Waste disposal.
Identifiers: *Feeding pens, *Slatted floors, Detention pits, Concrete tile lines.

Near Devine, Texas, is a cattle feedlot which has a total recycling system for feedlot wastes. Feeding pens, designed so that all waste material on the floor drains downward, are all concrete with half the area of each pen under roof. Floors are flushed at regular intervals causing waste material to drain into a concrete tile line which carries it into a two-compartment concrete detention pit. There quantities of clear water are added to the slurry. The liquid is lifted by a pump and flows under pressure through an underground pipeline to pivoting irrigation booms which sprinkle the 'brown water' on the soil of mowed fields. A second concrete pit provides an overflow catch basin which assures no escape of waste material. Coastal bermudagrass is the best grass for this type of fertilizer-irrigation. The grass goes through a dehydration process before it is pelleted to be fed to the cattle. This type of feedlot has been designed and tested to be sure the pollution was a thing of the past. This particular feedlot has won many awards for its success. (Cameron-East Central)
W74-10132

FEEDLOT WASTE MANAGEMENT: PROGRESS AND OUTLOOK,
Texas A and M Univ., College Station. Dept. of Agricultural.
J. M. Sweeten.
Texas Agricultural Progress, Vol 19, No 2, p 18-19, Spring, 1973.

Descriptors: *Waste disposal, *Waste treatment, *Feed lots, *Pollution abatement, *Farm wastes, Water pollution control, Odor, Recycling, Irrigation, Fertilization, Rainfall, Solid wastes, Regulation, *Texas.
Identifiers: *Waste mangement, Refeeding, Pyrolysis, Odor intensities, Climatic variables.

Water pollution abatement was an environmental pollution problem for Texas cattle feeders. The Texas Water Quality Board restricts seepage to ground water and forbids discharge of feedlot runoff from rainfall. To prevent this seepage, diversion channels, retention ponds and irrigation systems are constructed near playa lakes. Texas standards for feedlots may serve as a model for forthcoming federal water pollution limitations. Another environmental problem is the large number of manure stockpiles. These wastes are being disposed of by farmers interested in increased profits from crop production. Research of the USDA at Bushland, Texas, shows that 10-ton-per-acre applications of feedlot manure matched nitrogen-phosphorus-potassium fertilization in production of grain sorghum. Test results indicate that feedlot manure can be safely and economically applied at 10 tons per acre per year under many soil and cropping conditions. Besides land disposal, recycling methods involve converting animal wastes into animal feed, fuels, building materials and other products. Solutions to feedlot odor problems need to be developed. Odor intensities, climatic variables, and waste management practices need to be understood before this can be done. When these pollution problems have been solved, feedlot waste management may involve economic alternatives rather than being primarily involved with pollution abatement. (Cameron-East Central)
W74-10133

CLIMATE AND THE SELECTION OF A BEEF HOUSING AND WASTE MANAGEMENT SYSTEM,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
A. F. Butchbaker, G. W. A. Mahoney, and J. E. Garton.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 4, p 734-739, July-Aug, 1973. 5 fig, 1 tab, 27 ref.

Descriptors: *Climate, *Climatic data, *Climatic zones, *Feed lots, Farm wastes, *Waste treatment, Waste disposal, Cattle, Temperature, Moisture.
Identifiers: *Beef housing, Climatological maps.

Location of a beef feedlot is influenced by factors related to economics, local topography, nearness to residential areas, soil type, roads, microclimate, streams or lakes, area for waste disposal, and climatic conditions. This report is concerned with climate, one of the major considerations in determining a feedlot location because climate influences both capital investment and operating cost. Some of the climatic factors affecting waste management systems are those that also affect animal performance. These include temperature, humidity, solar radiation, wind, evaporation, precipitation, sunshine, and storms. These topics are explained. Beef housing climatic zones were developed by using air temperature, evaporation and precipitation. Another method of classifying beef housing and waste management systems is to develop a climatological map utilizing mean annual air temperature and moisture deficit. These climatological maps may be used to select a general waste management system. The waste management systems in the various climatological areas should be considered as those that are optimum for that area. (Cartmell-East Central)
W74-10134

MANAGING DEEP-PIT HOUSE TO REDUCE DRYING COSTS.
Egg Industry, Vol 6, No 7, p 31, 34, July, 1973. 2 tab.

Descriptors: *Farm wastes, *Poultry, *Drying, *Waste storage, *Costs, *Waste treatment, Temperature, Humidity, Ventilation, Sampling, moisture content, Maine.
Identifiers: Deep-pit poultry house, Pits, Dropping boards.

Research was done in Maine to try to reduce manure drying costs. The research was based on a study of four poultry farms, three brown-egg type houses, and one white egg. At each of the four farms, trials were run in winter, spring, and late summer. Manure samples were collected after one, two, and three-day accumulations--on both dropping boards and in the pit. Observations revealed that manure dried faster in the pit than on the boards after the first day. Manure dried to a lower moisture content during spring and summer in both pen and pit. The observations also indicated that under conditions normally present in Maine cage laying houses, the greatest amount of manure drying occurred the first day--regardless of location within the house. (Ballard-East Central)
W74-10135

MANURE IN PIT DRIES TO 15% MOISTURE,
Tennessee Univ., Knoxville.
H. C. Goan.
Poultry Digest, Vol 32, No 382, p 506-507, November, 1973. 1 fig.

Descriptors: *Farm wastes, *Moisture content, *Drying, *Poultry, *Waste storage, *Waste treatment, Aeration, Ventilation, Air circulation, Tennessee.
Identifiers: Fans, Deep-pit poultry house, Beetles, Marek's disease.

Manure in a high-rise or deep-pit poultry house in humid Robertson County, Tennessee, dries down to a moisture level of 15%. The 44x500-foot house has a capacity for 50,000 layers and the pit area is approximately seven feet deep. The pit is ventilated by fourteen 48 inch fans located in the side

the wall of the manure storage area. An additional fourteen 30 inch fans are located in the pit itself. Aiding in the drying process, the burrowing action of beetles of the lesser mealworm leave small holes and tunnels in the manure which are believed to greatly increase the drying process. So far the beetles have caused no problems, but because the beetles may be potential carriers of Marek's disease, chickens should be obtained that have been vaccinated against this disease. (Ballard-East Central)
W74-10137

FEEDLOTS POINT SOURCE CATEGORY: EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10139

CONCENTRATION OF PROTEINACEOUS SOLIDS FROM AERATED SWINE MANURE,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
L. W. J. Holmes.
MS Thesis, 1971. 92 p.

Descriptors: *Farm wastes, *Hogs, *Aeration, *Oxidation lagoons, *Recycling, Suspended solids, Sieves, Centrifugation, Amino acids, Proteins.
Identifiers: *Manure, *Refeeding, Proteinaceous solids, Oxidation ditch mixed liquor.

This study was undertaken to determine what fraction of swine oxidation ditch mixed-liquor (ODML) possessed a refeeding potential; and to determine the best method of recovery and concentration of this fraction. Swine ODML samples were passed through a series of sieves, ranging in size from 20-to 200-mesh. The solids retained on each screen were dried, weighed and analyzed for Kjeldahl nitrogen. The highest crude protein and largest weight fraction was contained in the smallest size fraction, those suspended solids passing through a 200-mesh sieve. Preliminary investigations indicated that centrifugation was a promising method of ODML S.S. concentration. Centrifuging trials were run on screened ODML to determine the optimum feed rate and G force required to produce a concentrated cake of approximately 6-8 percent solids dry weight basis (dwb). Increasing the feed S.S. concentration had the effect of decreasing S.S. recovery. Centrifuged samples of swine ODML were found to contain a greater percentage of essential amino acids than corn. Centrifugation has been shown to be a feasible method of concentrating the amino acid-rich portion of swine ODML. Liquid volume reduction on the order of 85 percent can be achieved by increasing the solids content of ODML from 1.2 to 8 percent. This solids concentration is sufficient to enable researchers to refeed a substantial amount of swine ODML S.S. without including the bulk of the carrier liquid in the feed. (Cartmell-East Central)
W74-10140

WASTE MANAGEMENT AND ANIMAL PERFORMANCE IN BEEF FEEDLOTS,
Nebraska Univ., Omaha.
W. Woods, T. M. McCalla, C. B. Gilbertson, and J. J. Ellis.
Nebraska Beef Cattle Report, Nebraska Agricultural Experiment Station, EC 72-218, p 26-28, 1972. 2 fig, 2 tab.

Descriptors: *Feed lots, *Cattle, *Control, Farm wastes, Density, Runoff, Consumption, Nebraska, Waste treatment.
Identifiers: *Waste management, Slope.

A waste management research program was developed with these objectives: (1) to maintain or improve the environment, (2) to permit growth and development of livestock industry, and (3) to recognize that changes in animal agriculture must be economically sound. The research program measured characteristics of runoff from feedlots, percolation into the soil, and animal responses to lot surface conditions, animal density, and lot slope. A comparison was made of 100 and 200 square feet per animal. One lot at each density was on 3, 6, and 9 percent slope. All cattle were fed the same ration to permit direct comparison of animal density and effect of slope of lot upon performance. Having cattle at 100 square feet per head reduced animal performance as compared to 200 square feet per head. At 200 square feet per head, lot surfaces were less than adequate and gains might be reduced. (Cameron-East Central)
W74-10141

EFFECTS OF PARTICLE SIZE ON THE AEROBIC TREATMENT OF ANIMAL WASTE,
Purdue Univ., Lafayette, Ind. Department of Agricultural Engineering.
J. A. Lindley.
MS Thesis, 1970, 122 p, 31 fig, 41 tab, 38 ref.

Descriptors: *Farm wastes, *Aerobic treatment, *Particle size, Chemical oxygen demand, Biochemical oxygen demand, Aeration, Sampling, Analysis, Feeds, Dairy industry, Cattle, *Waste water treatment, Volatility, Digestion.
Identifiers: Refeeding.

Design of efficient treatment processes (such as aerobic biological treatment) requires a thorough knowledge of the waste and effects of variation in this material. Research was conducted to study the effects caused from differences of fractions with particle sizes that could be measured by sieving techniques. The results of analyzing 24 samples of dairy farm wastes gave an average geometric mean particle size of 860.85 microns. The mean range was from 1490 microns to 402 microns. Organic content was found to increase with particle size of 860.85 microns. The mean range was from 1490 microns to 402 microns. Organic content was found to increase with particle size, while chemical oxygen demand and biochemical oxygen demand varies inversely with particle size. The rate of volatile solids decomposition in an aerobic treatment process may decrease with larger waste fineness values, but the effect is slight. (Frantz-East Central)
W74-10142

THE MAINE DEEP PIT CAGE LAYING HOUSE,
Univ., Maine, Orono.
C. W. Kittridge.
Paper No 70-915 presented at the 1970 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 8-11, 1970, 8 p, 3 fig, 1 tab, 1 ref.

Descriptors: *Farm wastes, *Poultry, *Waste storage, *Maine, Costs, Moisture, Dehydration, Drainage, Fertilizers, Confinement pens, Construction.
Identifiers: *Deep pit caged laying houses.

The deep pit caged laying house is a feasible method of poultry waste handling in northern climates. Wastes can be removed on a yearly or two-year basis. The wastes dry to an approximate moisture content of 50% and odors are practically nil during the storage period. Excavation of the deep pit is about 8 feet. Proper drainage must be insured and basement walls and floors must be watertight. Deep pit caged laying houses are economical because of infrequent waste handling. These systems, when properly constructed and managed, have been successful in Maine. (Frantz-East Central)
W74-10144

A ROTATING FLIGHTED CYLINDER TO SEPARATE MANURE SOLIDS FROM WATER,
Dept. of Agricultural Engineering. Oregon State Univ., Corvallis.
W. E. Verley, and J. R. Miner.
Paper No 73-410 presented at 1973 Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973, 9 fig, 3 tab, 6 ref.

Descriptors: *Farm wastes, *Slurries, *Water, *Waste treatment, *Waste disposal, *Sedimentation, *Separation techniques, Kinetics, Suspended solids, Oregon, Pumps, Weirs, Irrigation.
Identifiers: *Hydraulic manure transport systems, Settleable solids, Rotating flighted cylinder, Concentrated solids, Manure.

A rotating included tube, fitted with a helical fin on the inner surface was designed, built and tested to remove solids from liquid manure. Initially, a manure slurry of approximately 0.4 percent settleable solids was run through the device at 0.5 gallons per minute, averaging a settleable solids removal of 30 percent. The design of the device was revised from 8 inches in diameter to a 24 inch diameter tube and was retested. The device offered an increased volumetric capacity, consumed little power, and was immune to plugging problems. The concept is simple and has potential applications wherever it is desired to concentrate solids or claim water for reuse. (Frantz-East Central)
W74-10145

THE PERFORMANCE OF PRIMARY SETTLING ON LIVESTOCK FEEDLOT RUNOFF,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
J. C. Nye, A. L. Sutton, and E. R. Baugh.
Paper No 73-412 presented at 1973 Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973. 7 p, 2 fig, 1 tab, 2 ref.

Descriptors: *Livestock, *Cattle, *Feed lots, *Farm wastes, *Waste treatment, *Agricultural runoff, *Sedimentation, *Settling basins, Weirs, Indiana.
Identifiers: Porous dams, Fly breeding.

Primary sedimentation criteria were used to design a settling basin for runoff from a 200 head solid concrete beef feedlot. Sedimentation through the settling basin, consisting of three parallel chambers separated by porous dams, provided for settling rates of 3, 5.5, and 11 cubic feet per hour sq. feet of surface area for a 2-inch per hour rainfall intensity. Two problems were encountered--clogging of gravel dams, and fly breeding. A surface settling of 4 cu. ft/hr/sq. ft. and a weir loading rate of 100 cu. ft. per hr. per linear ft. were recommended as design criteria for feedlots of less than 300 head of cattle. A settling basin can be used in conjunction with lagoons in order to lower the lagoon loading. Porous dams may be eliminated by using liquid manure handling equipment to clean settling tanks. In some locations it may be possible to use this in conjunction with grass waterways and eliminate the need for lagoons or liquid handling equipment. (Drewry-East Central)
W74-10146

QUALITY DEGRADATION OF DAIRY WASHWATER,
California Univ., Riverside.
For primary bibliographic entry see Field 5B.
W74-10147

SETTLING SOLIDS IN ANIMAL WASTE SLURRIES,
Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
J. A. Moore, R. O. Hegg, D. C. Scholz, and E. Strauman.

Paper No 73-438 presented at the Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973, 17 p, 5 fig, 1 tab, 14 ref.

Descriptors: *Farm wastes, *Slurries, *Sedimentation, Sampling, Chemical oxygen demand, Livestock, *Waste water treatment, Suspended solids, Design data, Feed lots, Solid wastes, *Minnesota.
Identifiers: *Settling solids, Total solids, Volatile solids.

Research was conducted to develop design curves which may be used in applying sedimentation principles to the treatment of animal wastes. Samples of slurries were measured for solids at the tops of cylinders at 0, 1, 10, 100 and 1000 minutes. The chemical oxygen demand, total solids (TS), and total volatile solids (TVS) were determined for waste samples from poultry, beef and dairy cattle, horses, and swine. It was concluded that settling can efficiently remove TS and COD. The shapes of the design curves were almost identical regardless of the percent TS slurry within the range of 1 to .01%. TS values were generally higher than COD values. For closed recycling systems, one to ten minutes of detention time might be used for design purposes. (Frantz-East Central)
W74-10148

SYMPOSIUM: PROCESSING AGRICULTURAL AND MUNICIPAL WASTES.
Symposium held in New York, New York, August 27-28, 1972, 221 p, (1972) G. E. Inglett, editor. 90 fig, 66 tab, 301 ref.

Descriptors: *Research and development, *Waste treatment, *Recycling, *Waste disposal, *Farm wastes, Municipal wastes, Industrial wastes, Water pollution, Air pollution, Soil contamination, Environmental control.

To meet the needs of the increasing world population, cities became larger, industries expand, and agricultural operations become larger and more automated. All of these necessary increases in production result in a simultaneous increase in waste production and the problem of adequately dealing with this waste broadens. The papers of this symposium indicate that this problem is being met head-on, and technology is being devised, tested, and re-examined to deal with the waste problem. Advances in recycling animal, poultry, and industrial wastes have been recorded, but much more has been shown to be necessary. Various methods for utilization of these by-products have been outlined and offer very promising results. (See W74-10150 thru W74-10159) (Russell-East Central)
W74-10149

THE CHALLENGE OF WASTE UTILIZATION,
G. E. Inglett.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 1-5, (1972) 3 tab, 8 ref.

Descriptors: *Farm wastes, *Municipal wastes, *Livestock, *Waste treatment, *Waste disposal, Agricultural wastes, Industrial wastes, Technology, IEnvironmental control.
Identifiers: *Waste management, Processing, *Waste utilization, Meat consumption, Composting.

Large concentrations of people, animals, and manufactured goods create waste problems. In 1965, 575 billion pounds of solid waste were produced for disposal. Of this total, industrial waste accounted for 229 billion pounds. This leaves 60% of the total waste production to come from agricultural waste. Concentration of animal waste is highly dependent on the present trends of automation and centralization. In cattle, swine, dairy herds, and poultry, feedlots are becoming larger and fewer thus causing greater waste problems. Increasing consumption of meat with concomitant population growth can predictably bring more agricultural waste. For each pound of beef produced, 25 pounds of manure are produced. Thus, by 1980, 470 million tons of cattle manure will be produced for the estimated 235 million beef consumers in the United States. There is an immediate need for more technology for developing systems for waste management and utilization. Some of the proposed processes and related technology in this symposium may fill this need. (See also W74-10149) (Russell-East Central)
W74-10150

ECONOMIC ISSUES IN MANAGEMENT AND UTILIZATION OF WASTE,
A. C. Manchester, and J. G. Vertrees.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 6-12, (1972) 6 ref.

Descriptors: *Economics, *Waste treatment, *Recycling, Equity, Poultry, Livestock.
Identifiers: *Waste management, *Waste utilization, Public policy, Government cost-sharing.

There is no universal solution to waste management problems. Alternative waste management methods exist for most firms, creating a need for economic analysis to determine the least-cost solution. The economic choice is between waste treatment and waste utilization. Utilization offers more long term promise, but before launching large projects an analysis of waste utilization should be undertaken. In determining economic feasibility of utilization three factors should be considered: (1) the market potential of waste utilization products; (2) the cost of such a process; and (3) the cost of waste management alternatives. The potential for increased utilization of waste is dependent on public policy toward utilization and on equity. Government cost-sharing may stimulate industries into using wastes, and even without significant aid or price change, many firms will utilize waste from their operations as a least-cost means of waste management when the costs of alternatives are evaluated. (See also W74-10149) (Russell-East-Central)
W74-10151

PROCESSING ANIMAL WASTES FOR FEED AND INDUSTRIAL PRODUCTS,
J. H. Sloneker, R. V. Jones, H. L. Griffin, K. Eskins, and B. L. Bucher.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 13-28, (1972) 1 fig, 8 tab, 20 ref.

Descriptors: *Farm wastes, *Recycling, *Feeds, *Waste treatment, *Waste disposal, Nitrogen, Amino acids, Fermentation, Organic matter, Enzymes, Proteins.
Identifiers: Processing, Feed products, *Industrial products, Feedlot waste fractionation, Hardboard.

Reprocessing animal waste offers promising possibilities for elimination of a huge waste management problem. The average feeder steer generates 2.2 pounds of protein per day. If processed a feed of manure has a value comparable to soybean meal and is worth about $20 per ton more than the cost of recovery. By a simple screening process, approximately 70% of the total nitrogen can be recovered from feedlot waste as a potential feed fraction containing 35-40% protein and representing approximately 40% of the total waste solids. The remaining bulky fiber fraction can be converted into a cheap, nonodorous ingredient for fiberboard-like products. Alternatively, the fiber fraction and solubles can be recombined and used as a fermentation substrate for the cellulolytic fungus, T. viride. Studies with whole manure and the fibrous fraction indicate that more than 25% of the organic matter is digested by the fungus with complete retention of the nitrogen. These data illustrate that, potentially, T. viride enzymes as an additive can increase the digestibility and metabolizable energy of feeds. (See also W74-10149) (Russell-East Central)
W74-10152

PROCESSING ANIMAL WASTE BY ANAEROBIC FERMENTATION,
W. B. Coe, and M. Turk.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 29-37, (1972) 1 fig, 1 tab.

Descriptors: *Recycling, *Farm wastes, *Fermentation, *Anaerobic conditions, Aerobic conditions, *Wastewater treatment, Feed lots, Chemical analysis, Economics, Ammonia, Cattle.
Identifiers: Processing, Refeeding.

Wastes must be recycled into products which can be used by the producer of these wastes. The recycling must be conducted in a non-polluting and profitable manner. The most desirable recycling product is a feed ingredient. The two major systems for degradation of manure utilize microbial conversion and consist of aerobic processes. Recent efforts have been directed toward aerobic techniques, but these processes have proved to be costly. The anaerobic process is technically and economically the most attractive method of recycling animal wastes. This process produces two products (a feed ingredient and a fuel in the form of methane) useful to the animal feeder. It accepts all the wastes produced without pollutional discharges and is potentially profitable. The anaerobic process requires two-thirds the capital investment and one-half the annual operating expense of the aerobic process. (See also W74-10149) (Russell-East Central)
W74-10153

AGRICULTURAL CELLULOSIC WASTES FOR FEED,
T. Klopfenstein, and W. Kaers.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, Aug. 27-1972, p 38-54, (1972) 13 tab, 33 ref.

Descriptors: *Farm wastes, *Feeds, *Cellulose, *Waste treatment, Performance, Livestock, Silage, Inhibitors, Alkalinity.
Identifiers: Sodium hydroxide, Digestibility, Roughage.

Agricultural cellulosic wastes such as crop residues, fecal matter, paper, wood by-products and similar materials represent a vast supply of poorly utilized energy. Ruminants possess a unique digestive system which enables them to partially utilize the carbohydrate fraction of these materials. There are two procedures for enhancement of cellulosic waste usage. The first is the addition of sodium hydroxide to low-quality roughage followed by ensiling. At the present time, this appears to have practical application although the mechanics of collecting these low-quality roughages and addition of sodium hydroxide and water would appear to be the great problems. The second procedure utilizes high pressure and temperature treatment of forages. To be practical and economical, this procedure would require an operation where materials could be collected and treated at a large centrally located facility. However, with treatment of large quantities the cost could probably be held within a practical range. (See also W74-10149) (Russell-East Central)
W74-10154

NUTRITIVE EVALUATIONS OF ANIMAL MANURES,
L. W. Smith.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 28, 1972, p 55-74, (1972) 92 ref, 8 tab, 1 fig.

Descriptors: *Nutrients, *Farm wastes, *Recycling, *Feeds, Chemical properties, Nitrogen, Ruminants, Fermentation, *Cellulose.
Identifiers: *Waste utilization, Processing methods, Digestibility, Wastelage.

Three major factors influence chemical compositions of animal manures: (1) the species of animal; (2) the compositions of diets fed; and (3) nutrition. Feeding trials illustrate that poultry manure is high in nitrogen and is more advantageously utilized by ruminants than by other animals. Ruminants also have a lower digestibility of cell walls than do monogastric species. Thus, monogastric feces are shown to be superior in nutritive value to ruminant feces, as indicated by the higher nitrogen and low cell wall content. However, before manure can be utilized as a nutritive feed, economical processing methods must be developed. Several methods have been reported for using biological intermediates for recovery of protein from manure. Also rapid advances in physical, chemical, and fermentation technology will provide better methods for conversion of manures into products of high nutritive value for animal feeding. (See also W74-10149) (Russell-East Central)
W74-10155

AUTOMATED RECYCLE SYSTEM FOR LIVESTOCK WASTE TREATMENT,
E. P. Taiganides, and R. K. White.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 75-83, (1972) 10 fig.

Descriptors: *Recycling, *Farm wastes, *Waste treatment, *Livestock, *Automation, Oxidation lagoons, Effluent, Foaming, Influent, Biochemical oxygen demand.
Identifiers: Water flushing, Sludge index.

In today's large confined swine facilities, the waste handling and treatment system is often the factor controlling the success of the operation. Certain criteria must be considered in order to evaluate the livestock waste system; namely, ecology, economics, esthetics, and technology. A five hundred pig swine unit was tested by treatment and recycling of the effluent. Automated flushing from the swine building worked extremely well. There was little odor in the confinement building and no odor in the waste facility. Foaming of the oxidation ditch was a problem but a foam-suppressing drum has been the most suitable method for controlling the foam. Over a ninety percent reduction in the biochemical oxygen demand of the influent to the oxidation ditch, as compared to the effluent for recycling, has been achieved. The use of a Sludge Index has been found to be a good parameter for monitoring the operation of the oxidation ditch. (See also W74-10149) (Russell-East Central)
W74-10156

FUEL FROM AGRICULTURAL WASTES,
H. R. Appell, and R. D. Miller.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 84-92, (1972) 5 ref, 5 tab.

Descriptors: *Farm wastes, *Fuels, *Oil, *Waste treatment, Organic matter, Biodegradation, Waste water reclamation, Cellulose, Catalysts, Carbohydrates.
Identifiers: Ash content, Carbon monoxide, Raw materials.

Recognition of the increasing severity of a variety of wastes having a high carbohydrate content, largely cellulose, to the solid wastes problem has resulted in an increased research effort to find uses for waste materials. The conversion of a heavy oil has been one proposed method. A mechanism for the conversion of carbohydrates to oil consists of the following steps: (1) reaction of sodium carbonate and water with carbon monoxide to yield sodium format; (2) dehydration of vicinal hydroxy groups in a carbohydrate to an enol, followed by isomerization to a ketone; (3) reduction of the newly formed carboxyl group to the corresponding alcohol with formate ion and water; and (4) the hydroxyl ion then reacts with additional carbon monoxide to regenerate the formate ion. Although manures are in some respects a desirable feedstock for conversion to oil, the high nitrogen content, the high ash content, and the malodorus aqueous effluent pose problems for further research. (See also W74-10149) (Russell-East Central)
W74-10157

ENERGY FROM THE PYROLYSIS OF AGRICULTURAL WASTES,
M. D. Schlesinger, W. S. Sanner, and D. E. Wolfson.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 93-100, (1972) 4 ref, 3 tab, 1 fig.

Descriptors: *Farm wastes, *Waste treatment, *Waste disposal, Volatitity, Cattle, Energy.
Identifiers: *Pyrolysis, Wood waste, Crop wastes, High moisture feedstock.

Experiments were conducted on various agricultural wastes which involved pyrolysis, or the heating of a material to a high temperature in the absence of air. Materials that cannot be burned cleanly in incinerators can be converted to gases, oils, or solids that can be burned cleanly by known methods. Generally, wastes are not available on a year-round basis except in a limited number of circumstances. Crops are harvested at particular times of the year, and feedlots may vary in their population. Because of this irregularity, it seems important to convert wastes of different composition and quantity into a form that may approach compatibility with industrial firing practices. Pyrolysis provides this conversion and is selfsufficient in energy requirements. Practically all the energy in the feeds is recovered in the products. (See also W74-10149) (Russell-East Central)
W74-10158

COMPOSTING AGRICULTURAL AND INDUSTRIAL ORGANIC WASTES,
S. J. Toth.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 172-182, (1972) 8 ref, 4 tab.

Descriptors: *Farm wastes, *Industrial wastes, Moisture content, Aeration, Nitrogen, Phosphorus, Potassium, Livestock, Poultry, Sewage sludge, Municipal wastes, Chemical properties, Physical properties, *Waste treatment, *Organic wastes.
Identifiers: *Composting, Organic residues, Cellophane wastes.

Composts, like plant residues and organic wastes, tend to produce changes in the physical and chemical properties of soils in which they are incorporated. One of the changes in physical properties is an increase in soil aggregation. Addition of composts to soils also adds to the nitrogen, phosphorus, and potash contents of the soils. Many factors such as moisture content, aeration, nitrogen, phosphorus, and potassium, affect composting rates. When composting is finished, the ideal compost has a dark brown color, 80% organic matter, a moisture level of 10-20%, a water holding capacity of 150-200%, an ash content of 10-20%, a nitrogen content of 2.5-3.5%, a phosphorus oxide and potassium oxide content of 1-1.5%, a pH of 5.5-6.5%, and a slightly musty odor. Composts not only consist of animal wastes, but also industrial wastes which are high in carbon or organic matter. Municipal garbage has been studied as a composting material, but these products have little agricultural value when spread on land. (See also W74-10149) (Russell-East Central)
W74-10159

INTERNATIONAL SYMPOSIUM ON WASTEWATER TREATMENT IN COLD CLIMATES.
Environmental Protection Service, Ottawa (Ontario).
In: Symposium held at University of Saskatchewan Saskatoon, August 22-24, 1973. Environment Canada, Economic and Technical Review Report EPS 3-WP-74-3, Water Pollution Control Directorate, Ottowa, Canada, 1974. 595 p.

Descriptors: *Waste water treatment, *Cold regions, *Waste disposal, *Water supply, Sewage treatment, Temperature, Sewage lagoons, Disinfection, Aeration, Oxidation, Biological treatment, Chemical treatment, Efficiencies, Costs, Planning, Denitrification, Water quality, Water conservation, Anaerobic digestion, Canada, United States, Phosphorous, Chlorine, S.S.R.

A collection of 28 articles was collated relating to the problems and possible solutions of water supply and waste water treatment in cold environments. Contributions were predominantly from Canada and the United States but 5 other countries were represented. Reports include engineering and research articles, planning discussions, and some quantitative analyses. (See also W74-10161 thru W74-10187) (Shaffer-FIRL)
W74-10160

AN EVALUATION OF WASTE DISPOSAL PRACTICES IN ALASKA VILLAGES,
Alaska State Dept. of Environmental Conservation, Fairbanks.
A. J. Alter.
In: International Symposium on Wasterwater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 1-28, 1974. 12 tab.

Descriptors: *Water supply, *Waste disposal, *Cold regions, *Waste water treatment, Environmenatl control, Biological properties, Chemical properties, Physical properties, *Alaska.
Identifiers: *Cold climates, Environmental management.

Special problems associated with the provision of an adequate water supply and waste disposal in cold climates are discussed. Recommendations are made as to appropriate planning procedures for communities, research needs in the biological, chemical, and physical performance of existing waste treatment methods and of non-frost susceptible methods of environmental management, and the development of realistic, reasonable and equitable methods of finance for supply and treatment systems. (See also W74-10160) (Shaffer-FIRL)
W74-10161

SEWAGE TREATMENT METHODS IN FINLAND,
National Water Board of Finland, Helsinki. Research Inst.
M. Viitasaari.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 29-44, 1974. 10 fig, 2 tab, 4 ref.

Descriptors: *Sewage treatment, *Chemical precipitation, *Biochemical oxygen demand, *Temperature, Oxidation lagoons, Infiltration, Cold regions, *Waste water treatment, Coagulation, Filtration.
Identifiers: Simultaneous precipitation, Direct precipitation, Final coagulation, Mireinfiltration, *Finland.

The Finnish Water Conservation Policy is reviewed. The goals and achievements of using different treatment methods (e.g. simultaneous precipitation, direct precipitation, final coagulation, stabilization ponds, mireinfiltration) are discussed and compared. Four examples of vari-

ous treatment plants' reduction of BOD in percent vs. monthly average temperatures are given. Long term BOD studies were done to compare the effects of treated and untreated effluent. It was shown that untreated effluent exerts a two stage BOD on receiving waters, the second stage coming after approximately 30 days. Treated effluent was found to have a low and constant BOD value. (See also W74-10160) (Shaffer-FIRL)
W74-10162

SWEDISH EXPERIENCES IN SEWAGE TREATMENT,
National Swedish Environmental Protection Board, Solna.
L. Ulmgren.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 45-64, 1974. 6 fig, 6 tab.

Descriptors: *Waste water treatment, *Sewage treatment, *Temperature, *Lime, Biological treatment, Chemical treatment, Chemical precipitation, Cold regions.
Identifiers: *Sweden, *Alum, *Iron salts.

Various methods of sewage treatment are compared including: chemical vs biological treatment; precipitation with lime (slaked or un-slaked) as compared with alum (aluminum sulphate) or iron salts; and various types of sludge treatment. Design guidelines are provided. Any plant located in an area with more than 30 days where the temperature is below minus 10C should be covered. In the colder areas chemical treatment is superior to biological treatment. (See also W74-10160) (Shaffer-FIRL)
W74-10163

SEWAGE TREATMENT IN THE NORTHERN AREAS OF THE U.S.S.R.,
L. A. Alferova, I. V. Skirdov, V. G. Ponomarev, B. M. Hudenko, and B. A. Gladkov.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 64-74, 1974. 3 tab.

Descriptors: *Waste water treatment, *Sewage treatment, *Treatment facilities, *Temperature, *Biological treatment, Oxidation, Nitrification, Bacteria, Cold regions.
Identifiers: *USSR, Qu unit, Apt units, Oxitank, Specific oxidation.

Various types of treatment units are discussed with special reference to compact units for small settlement areas. Temperature effects on biochemical processes are reviewed. As the temperature was reduced the biochemical purification of activated sludge was reduced and the specific oxidation rate of organic substances was decreased. The number of bacterial types also decreases with a drop in temperature. Numbers and activity of bacteria associated with the second phase of nitrification showed a reduction at temperatures above 37C or below 15C, especially below 10C. (See also W74-10160) (Shaffer-FIRL)
W74-10164

PROBLEMS OF THE CANADIAN NORTH,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
F. G. Hurtubise.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 75-84, 1974.

Descriptors: *Waste water treatment, *Sewage treatment, *Canada, Planning, Swamps, Lakes, *Lagoons, *Temperature, *Sewage disposal, Incineration, Fertilization, Cold regions.
Identifiers: *Bio disc, Plasticized bags, Vacuum toilet, Recirculating toilet.

The role of the Canadian Environmental Protection Service is examined. Projects in the Northwest Territories are outlined. These include: a study on the use of swampland lakes for sewage treatment; the use of vacuum and recirculating toilet units for sewage collection with subsequent incineration disposal; feasibility of land disposal of sewage effluent or use as fertilizer in permafrost areas; the practicability of the use of physical-chemical and rotating bio-disc treatment plants; the use of lagoon systems to serve isolated institutions; and the use of plasticized paperbags to replace garbage cans. (See also W74-10160) (Shaffer-FIRL)
W74-10165

EXTENDED AERATION, CLARIFICATION AND ANAEROBIC TREATMENT CYCLE,
C. D. Hughes.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 85-98, 1974. 3 fig, 3 tab.

Descriptors: *Aeration, Temperature, *Anaerobic digestion, *Anaerobic conditions, Treatment facilities, Sewage treatment, Biochemical oxygen demand, Cold regions, Design criteria, Costs, *Waste water treatment, *Canada.
Identifiers: Extended aeration, *Clarification, *Brandon(Man.-Candad).

The City of Brandon, Manitoba required a sewage treatment facility to handle 4 to 5 million gallons of industrial and domestic sewage per day during a 4 month winter period. Test results indicate that a mixed system with clarification and sludge return is very effective and not drastically affected by temperature, oxygen variation, or sludge quantity. Twenty hours extended aeration, followed by anaerobic treatment in cold temperatures, can give an economical method of treating sewage and give BOD reduction of 92 percent or better. Some criteria are included. (See also W74-10160) (Shaffer-FIRL)
W74-10166

FURTHER FIELD INVESTIGATION ON AERATED LAGOONS IN THE CITY OF WINNIPEG,
Winnipeg Waterworks, Waste, and Disposal Div. (Manitoba).
R. M. Girling, A. R. Pick, and D. W. Van Es.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 99-124, 1974. 12 fig, 7 tab, 5 ref.

Descriptors: *Waste water treatment, *Canada, *Aerated lagoons, *Aerobic conditions, *Anaerobic conditions, *Nitrification, Temperature, Cold regions, Sludge digestion, Biochemical oxygen demand, Carbon, Aeration, Suspended solids, Performance.
Identifiers: *Total organic carbon, *Winnipeg(Man.-Canada).

The City of Winnipeg made modifications to several of its aerobic-anaerobic lagoons to operate them in series and to test the effectiveness of this method. Included was a test of reduction in total solids during a no feed period. Results were: good BOD reduction (82 percent for system, 50 percent for first lagoon); suspended solids decline through the system; dissolved oxygen was generally above 1 mg/liter in all system parts; temperature decreased through the cell sequence; total organic carbon decreased through the cell sequence; observed significant nitrification well below 10C; the four month no feed period (aeration) had a negligible effect on reducing sludge accumulation; effluent was determined to be satisfactory. (See also W74-10160) (Shaffer-FIRL)
W74-10167

THE EFFECTS OF WATER TEMPERATURE AND ELEVATION UPON AERATION,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
J. S. Hunter, and J. C. Ward.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 125-169, 1974. 8 fig, 2 tab, 24 ref. OWRR A-006-COLO(5), 14-31-0001-3206.

Descriptors: *Waste water treatment, *Water temperature, *Aeration, *Elevation, Cold regions, Mass transfer, *Colorado, Efficiencies, Equations.

A laboratory scale mechanical aeration system simulating near perfect mixing conditions was used to study variation in oxygen transfer rates into water as a function of changes in water temperature (0-40C) variation in overall volumetric mass transfer coefficient for aeration systems which varies linrly with temperature and can be predicted from equation provided. This equation in conjunction with others is usable to construct diagrams of combined effects that elevation and water temperature have on aeration. These diagrams show that factors related to increasing altitude which reduce aerator output predominate over these factors tending to exhaust aerator output. (See also W74-10160) (Shaffer-FIRL)
W74-10168

DIFFUSION SYSTEM FOR COLD CLIMATE LAGOONS,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
C. D. Christianson, and D. W. Smith.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 170-206, 1974. 13 fig, 1 tab, 34 ref.

Descriptors: *Diffusion, *Cold regions, *Aerated lagoons, *Alaska, Dissolved oxygen, Efficiencies, Costs, Maintenance, Ice fog, *Waste water treatment.
Identifiers: Fine bubble diffuser, Coarse bubble diffuser, *Fort Greely(Alas).

Studies to compare coarse and fine bubble aerators were carried out at the Fort Greely lagoon. Dissolved oxygen levels were monitored in both water and sludge. Horsepower requirements of different systems were calculated. Conclusions reached were the fine bubble diffusers are more efficient in oxygen transfer than coarse bubble diffusers, but not necessarily more economical; power requirements in lb 02 per horsepower-hour may be higher for fine bubble diffusers; maintenance requirements are higher for fine bubble diffusers. Oxygenation efficiencies published in the literature may be used for aerated lagoon design but where ice fog is a problem, one must use a larger number of diffusers at increased spacing. (See also W74-10160) (Shaffer-FIRL)
W74-10169

WASTE TREATMENT PERFORMANCE DATA AT PRINCE ALBERT PULP COMPANY,
Prince Albert Pulp Co. Ltd., (Saskatchewan).
O. K. Aschun.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 207-219. 8 fig, 3 ref.

Descriptors: *Pulp and paper industry, *Pulp wastes, Waste water treatment, Biochemical oxygen demand, Cold regions, Toxicity, Performance, *Canada.
Identifiers: *Prince Albert(Sask.-Can.).

Steady state waste treatment data gathered over an 18 month period is presented. These data illustrate the effects of long term trends in production

changes and seasonal effects. There was a marked decrease in BOD during the warm summer months attributed to higher water temperatures. Toxicity tests and results are given. (See also W74-10160) (Shaffer-FIRL)
W74-10170

SURFACE AERATION OF DOMESTIC WASTES SECTION 1 - THE BONNTBROOK SEWAGE TREATMENT PLANT,
Calgary Bonnybrook Treatment Plant (Alberta).
E. I. Meckelborg.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p220-229, 1974. 4 fig, 1 tab.

Descriptors: *Water temperature, *Ice fog, *Aeration, *Canada, Waste water treatment, Biochemical oxygen demand, Efficiencies, Cold regions, Performance.
Identifiers: Clarifiers, Calgary(Alb.-Canada).

The article is a description of the Bonnybrook plant and some problems in the secondary treatment facilities during winter months. Aerator icing emerged as the number one problem. Frozen scum on final clarifiers appears to be infrequent. A minor problem is dense fog over aeration tanks. Analysis of the performance data indicate that during winter months (final effluent temperature below 52F) there was an increase in BOD removal efficiency with an increase in final effluent temperature. (See also W74-10160) (Shaffer-FIRL)
W74-10171

SURFACE AERATION OF DOMESTIC WASTES OPERATING EXPERIENCES AT RED DEER, ALBERTA, SECTION II,
Reid Crowther and Partners Ltd., Calgary (Alberta).
P. D. Lawson.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 230-239, 1974. 6 fig.

Descriptors: *Waste water treatment, *Aeration, Water temperature, *Ice, Cold regions, *Aerated lagoons, *Canada, Efficiencies, Performance.
Identifiers: *Red Deer(Alb.-Canada).

A description of lagoon treatment facilities at Red Deer is given, along with conclusions concerning temperature effects. There is a rapid initial drop in temperature in aerated lagoons when there is a large thermocline from air to water. Ice cover reduces temperature loss. Equilibrium (thermal) is quickly reached. (See also W74-10160) (Shaffer-FIRL)
W74-10172

ON THE COMBINED TREATMENT OF DOMESTIC SEWAGE AND WASTE WATER FROM WOOD INDUSTRIES,
Oulu Univ. (Finland).
J. U. Airaksiner.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 241-257, 1974. 4 fig, 3 tab, 15 ref.

Descriptors: *Pulp and paper industries, *Pulp wastes, Domestic wastes, *Waste water treatment, Water temperature, Performance, Efficiencies, Activated sludge, Cold regions, Aeration.
Identifiers: *Finland, Extended aeration, Waste ponding, Wood industries, Combined treatment.

A review of wood industries' contribution to the waste load of Finnish waters is presented. Eighteight percent of Finland's BOD is a result of wood industry processes. Combined treatment of domestic and wood industry effluent is discussed as to its advantages and disadvantages. Results of three pilot plant investigations are presented. The three treatment methods are: activated sludge process, extended aeration method, and waste ponding. Results show good standards can be achieved by combined treatment of domestic and wood industry effluent. Temperature has a strong effect on efficiencies, especially in waste ponding where the volume of the ponds must be increased to achieve the desired results. (See also W74-10160) (Shaffer-FIRL)
W74-10173

VACUUM SEWER SYSTEMS FOR NORTHERN APPLICATIONS,
Project Planning Associates Ltd., Toronto (Ontario).
D. W. Averill, and G. W. Heinke.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 258-286, 1974. 5 fig, 21 ref.

Descriptors: Waste water treatment, *Sewerage, Soil properties, Topography, Maintenance costs, *Operating costs, Capital costs, Cold regions, Canada, Alaska.
Identifiers: Bahamas, *Vacuum sewer system, Vacuum transport theory, *Waste water collection.

Where water is scarce, construction materials expensive, and topography and soil conditions incompatable with required grade lines for conventional sewer systems, the vacuum sewer system can be a practical alternative for waste water collection. Use of this type of system to date in the Bahamas, Canada, and plans for use in Alaska are reviewed. Also included is a section on vacuum transport theory as well as operations, maintenance, and capital costs. Advantages cited for this type of system include: horizontal and upgrade transport, flexibility, water savings. Vacuum toilets use about one quart of water per flush as compared with conventional toilets using 2 to 4 gallons per flush. (See also W74-10160) (Shaffer-FIRL)
W74-10174

VACUUM SEWAGE TRANSPORT AND TREATMENT IN RURAL AREAS IN DENMARK,
Electrolux A/S (Denmark).
F. Jespersen.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 287-304, 1974. 6 fig, 11 ref.

Descriptors: *Waste water treatment, *Sewage treatment, *Waste disposal, *Water conservation, Bacteria, Water demand, Cold regions, Water reuse, Water quality, Rural areas.
Identifiers: *Denmark, *Black water, *Grey water, *Vacuum sewage, Waste water collection.

The advantages and potential applications of vacuum sewer systems in Denmark are reviewed. Two of the major arguments presented are: by use of the vacuum system household water demand could be reduced by as much as 50 percent and since black water (e.g. water plus human wastes) is the major source of pathogenic bacteria and nutrient salts, if one separates its handling from grey water, great economies in collection and treatment costs could be realized and improved water quality. If collected separately sewage waste volume could be reduced to 5 percent the present level. Incineration or chemical treatment could be used to dispose of this black water concentrate. (See also W74-10160) (Shaffer-FIRL)
W74-10175

PSYCHROPHILES IN WASTE TREATMENT,
Toronto Univ. (Ontario). Dept. of Civil Engineering.
J. G. Henry.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 305-331, 1974. 3 fig, 4 tab, 32 ref.

Descriptors: *Waste water treatment, *Bacteria, *Temperature, *Metabolism, Treatment facilities, Models, Canada, Cold regions, Pseudomanas, Actinomycetes, Activated sludge, Waste treatment.
Identifiers: *Psychrophiles, *Mesophiles, Flavobacterium, Vibrio, Achromobacter.

The relationship between low temperature, psychrophilic bacteria and their metabolic activity is compared to mesophiles. The study was divided into four areas: full scale treatment plants, pure culture batch tests, continuous mixed culture model studies, and identification of bacteria from model systems. One outcome of study was the lack of a distinct line separating psychrophiles from mesophiles. It was also found that psychrophiles are present in substantial numbers in activated sludge plants, at normal operating temperatures (7C to 27C). Also, the relation between microbial activity and temperature is non-linear. A decrease in activity accelerates at the lower temperatures. Psychrophilic species include Pseudomanas, Flavobacterium, Achromobacter, and Vibrio. (See also W74-10160) (Shaffer-FIRL)
W74-10176

BIO-PROCESSES OF THE OXIDATION DITCH IN A SUB-ARCTIC CLIMATE,
Dames and Moore, Fairbanks, Alaska.
R. S. Murphy, and K. R. Rananthau.
In: International Symposium On Wastewater Treatment In Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 332-357, 1974. 7 fig, 6 tab, 12 ref.

Descriptors: *Biodegradation, Temperature, Cold regions, *Waste water treatment, *Alaska, Activated sludge, *Aeration, Costs, Biological oxygen demand, Suspended solids, Design criteria, Treatment facilities, *Oxidation lagoons.
Identifiers: *Extended aeration.

Waste treatment in Arctic areas shares the same problems as treatment needs world wide, that is: climate, economics, and low population. The extended aeration modification of the activated sludge process appears to be a highly suitable alternative for the treatment of small volumes of waste. This paper examines one form of the extended aeration process, the oxidation ditch. One such facility at College, Alaska was studied during 1967-1968 and showed a 90 percent BOD and suspended solids reduction at 50 percent loading. It was also found that biological processes operated at essentially the same rate at low temperatures as at higher temperatures in more moderate climates. Some design criteria are also included. (See also W74-10160) (Shaffer-FIRL)
W74-10177

LOW TEMPERATURE EXTENDED AERATION THROUGH THE USE OF A FLOATING TUBE SETTLER AND WOOD STAVE TANKAGE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
T. D. Buzzell, C. R. Sherwood, and P. F. Wilbur.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 358-379, 1974. 8 fig, 1 tab, 12 ref.

Descriptors: *Cold regions, *Aeration, *Temperature, *Design criteria, *Treatment facilities, *New Hampshire, *Waste water treatment, Biochemical oxygen demand, Suspended solids, Performance, Clarification.
Identifiers: Floating tube settler, Air diffuser, Low head air blower.

A single tank extended aeration system is described which provides satisfactory secondary

treatment performance, reduces logistics problems, lowers costs, and does not require encapsulation. The system consists of a 2000 gallon redwood stave tank, dual low head air blowers, dual cycle time clocks, necessary air flow piping, a Marlof Rollmix Air Diffuser Assembly, and a floating tube settler. The most significant development is that of the floating tube settler which provides automatic adjustment to peak flow demands, and significantly reduces retention time as compared to typical clarifier units. Design criteria are included. (See also W74-10160) (Shaffer-FIRL)
W74-10178

LOW TEMPERATURE DENITRIFICATION OF WASTEWATER,
McMaster Univ. (Ontario).
R. M. Sutton, K. L. Murphy, and R. N. Dawson.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, 1974. p 380-403, 9 fig, 4 tab, 29 ref.

Descriptors: *Denitrification, *Temperature, *Cold regions, *Waste water treatment, Treatment facilities, *Canada, Performance, Efficiences, Nitrates, Nitrites.
Identifiers: *Stirring tanks, *Packed columns.

The rate of denitrification was determined under various conditions of loading and temperature to ascertain the practicability of the biological denitrification process. The experimental design employed five temperature levels, and two levels of sludge in a stirred tank reactor, as well as five detention time intervals in packed columns. Results showed the stirred tank method providing water with a concentration of less than 1 mg/liter nitrate plus nitrite N2 at temperature 10C or higher, whereas packed columns required temperatures of 20C to 25C to achieve the same results. Packed columns did appear to be superior to the stirred tank in suspended solids reduction. (See also W74-10160) (Shaffer-FIRL)
W74-10179

A DESCRIPTION OF SOME RECENT RESEARCH WORK OF PARTICULAR INTEREST FOR THE INTRODUCTION OF NEW WASTEWATER TREATMENT METHODS IN NORWAY,
Ministry of Environment, Oslo (Norway).
J. Abrahamsen.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 403-422, 1974. 7 fig, 6 tab, 8 ref.

Descriptors: *Waste water treatment, *Treatment facilities, *Nutrient removal, *Biological treatment, *Chemical treatment, Performance, Efficiencies, Design, Cold regions, Costs, Sludge treatment, Phosphorus.
Identifiers: *Norway, *Mechanical treatment.

A review is made of Norway's PRA program which has been surveying the theoretical and practical knowledge of different processes of waste water treatment. Areas in which PRA has concentrated its efforts include: chemical removal of phosphorous salts; operation and study of mechanical, chemical, and biological effects on different recipients of different treated water, and aerobic stabilization of sludge. (See also W74-10160) (Shaffer-FIRL)
W74-10180

AN OVERVIEW OF THE PROBLEMS OF DISINFECTION,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
C. W. Chambers.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 423-437, 1974. 4 fig, 1 tab, 15 ref.

Descriptors: *Disinfection, *Chlorination, *Environmental sanitation, *Temperature, *Cold regions, Costs, Performance, Efficiencies, Bromine, Chlorine, Ozone, Lime, Ultraviolet radiation, Heat.
Identifiers: Bromine chloride, Chlorine dioxide.

A variety of disinfectants are discussed, with primary emphasis on factors having major impacts on the effectiveness of the physical and chemical agents being considered, especially low temperatures. Among the disinfectants considered are chlorine, iodine, bromine and bromine chloride, chlorine dioxide, ozone, ultraviolet light, and heat. Chlorine exhibited lowered disinfectant potency at low temperatures and high pH values. Bromine and bromine chloride exhibit similar responses. Chlorine dioxide would appear unfeasible for Arctic use. Ozone seems a promising alternative but needs more testing. Excess lime creates the need for pH adjustment before release of the effluent. Ultraviolet radiation and heat may have cost constraints. (See also W74-10160) (Shaffer-FIRL)
W74-10181

CHLORINE DISINFECTION OF WASTEWATER,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
C. R. Gordon, C. V. Davenport, and B. H. Reid.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 438-481, 1974. 11 fig, 7 tab, 35 ref.

Descriptors: *Waste water treatment, *Disinfection, *Chlorination, Temperature, *Toxicity, Environmental sanitation, Cold regions, Performance, Efficiencies, *Alaska, Hydraulic structures, Design flow.
Identifiers: Batch flow, Contact time, Plug flow.

A two-phase study was carried out to determine if chlorination could provide satisfactory disinfection of waste water at temperatures less than 1C. The first phase consisted of batch treatment with rapid chlorination and continuous stirring. Four effluents were tested (primary sedimentation system, a 15 day detention time aerated lagoon, and two extended aeration systems). The tests were run at less than 1C with controls run at 25C. Effective disinfection was achieved in all four effluents at less than 1C with a 60 minute contact time and no more than 1 mg/liter residual chlorine. The second phase of the study consisted of running primary sedimentation effluent through a well baffled flow-through chlorine contact chamber at less than 1C. Acceptable reduction of coliforms was not reached in the flow-through chambers at less than 1C until residual chlorine reached 2 mg/liter. Doubling contact time to 120 minutes allowed proper disinfection with only 0.5 to 0.6 mg/liter. Conclusions are drawn, the most important being that contact time appears to be as important as maintenance of a particular chlorine residual level. (See also W74-10160) (Shaffer-FIRL)
W74-10182

LIME DISINFECTION OF SEWAGE BACTERIA AT LOW TEMPERATURE,
Colorado State Univ., Fort Collins. Dept. of Microbiology.
S. M. Morrison, and K. L. Martin.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 482-506, 1974. 9 fig, 3 tab, 21 ref.

Descriptors: *Disinfection, *Temperature, *Lime, *Biochemical oxygen demand, *Phosphates, Performance, Efficiencies, Environmental sanitation, *Waste water treatment, Colorado, Cold regions.
Identifiers: *Orthophosphates.

Studies were conducted to determine: the effects of high pH on raw and treated sewage bacteria at low temperatures (1C to 15C); degree of BOD removal from waste water at high pH and low temperature; effectiveness of lime as a precipitator of orthophosphate from sewage at low temperature. Results showed that raw domestic settled sewage and secondary sewage effluent could be disinfected to a relatively safe level by lime contact for less than 90 minutes at a pH of 11.5 or higher. The high pH lime systems also significantly reduced both BOD and orthophosphate concentrations. Recommendations for additional studies are made. (See also W74-10160) (Shaffer-FIRL)
W74-10183

OZONE DISINFECTION OF WASTEWATERS AT LOW TEMPERATURES,
Cincinnati Univ., Ohio. Dept. of Civil and Environmental Engineering.
R. N. Kinman.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 507-521, 1974. 2 fig, 6 tab, 12 ref.

Descriptors: *Disinfection, *Hydrogen ion concentration, *Ozone, *Temperature, Performance, Efficiencies, Environmental sanitation, *Waste water treatment, Cold regions, Water quality control, Ohio, Coliforms.
Identifiers: Fecal streptococci.

In this study O3 was used to disinfect poorly treated effluents and well treated effluents under low temperature (1C and above) conditions. The pH effect was also tested under these conditions. The study revealed that O3 is more independent of pH effects or temperature effects than any other readily available disinfectant. O3 was found to destroy coliform, total bacteria and Fecal streptococci more rapidly at any pH or temperature than chlorine or iodine. Problems with the use of O3 for arctic treatment facilities are: power costs of generation, need for onsite generation; and the difficulties of O3 transfer from gas to liquid medium. (See also W74-10160) (Shaffer-FIRL)
W74-10184

FEASIBILITY OF PHYSICO-CHEMICAL TREATMENT OF RAW SEWAGE AT LOW TEMPERATURES,
McMaster Univ., Hamilton (Ontario). Dept. of Chemical Engineering.
R. Maqsood, and A. Benedek.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 523-548, 1974. 14 fig, 24 ref.

Descriptors: *Waste water treatment, Sewage treatment, *Water quality control, Temperature, *Chemical treatment, Performance, Efficiencies, Canada, Cold regions, Biochemical oxygen demand, Chemical oxygen demand, Water quality control, Environmental sanitation, *Activated carbon, Feasibility studies.
Identifiers: Granular activated carbon, Powdered activated carbon, *Physico-Chemical treatment.

The article is a discussion of the effects of low temperatures on the performance of Physico-Chemical treatment plants. These units operate after the large particles are removed from the effluent and after it has been treated with metallic coagulants (alum, etc.) and polymeric flocculants. The PTC method employs either Granular Activated Carbon (GAC) or Powdered Activated Carbon (PAC). The use of PAC requires an additional step, the separation by sedimentation of the PAC particles from the sewage. Powdered carbon sludge is not currently susceptible to regeneration though GAC is, by thermal means. The advantages of PTC over biological treatment include: delivery of 10 mg/liter BOD and 30 mg/liter COD on a con-

tinuous basis; insensitivity to hydraulic and organic variations of influent; improved removal of phosphorous and heavy metals. Disadvantages of PTC include: high operating costs and inadequate design and operational experience. Conclusions drawn include: chemical coagulation is influenced by temperature but not to the extent of infeasibility. PAC absorption is little effected by low temperature; and kinetics are temperature dependent but less sensitive than biological processes. (See also W74-10160) (Shaffer-FIRL)
W74-10185

ALASKA VILLAGE DEMONSTRATION PROJECTS: FIRST GENERATION OF INTEGRATED UTILITIES FOR REMOTE COMMUNITIES,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
B. H. Reid.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 549-569, 1974. 6 fig, 11 ref.

Descriptors: *Rural areas, *Community development, *Cold regions, *Waste water treatment, Facilities, Costs, Water conservation, Water demand, Water supply, Water distribution, Water utilization, Incineration, *Alaska.
Identifiers: *Community facilities, *Vacuum toilets.

Under Section 20. Public Law 91-224, April 3, 1970, Congress authorized the Secretary of Interior to carry out the Alaska Village Demonstration Projects (AVDP). The projects were to include, 'provisions for community safe water supply systems, toilets, bathing and laundry facilities, sewage disposal facilities, and other similar facilities'. The projects were assigned to the Office of Research and Development and the Arctic Environmental Research Laboratory. In developing the project concept certain objectives were established, including: the provision of a system of facilities that would be simple, reliable, inexpensive, and yet a real improvement over existing conditions; provide water for domestic use that met Federal and State quality requirements; and treat and dispose of all wastes (air, water, solid) in such a manner as to meet future Federal and State regulations. In achieving these goals some of the following processes and equipment were used: vacuum toilets; separation of grey water from black water; physico-chemical treatment of waste water with reuse in laundering facilities; incineration of black water residue and sludge from waste water treatment; utilization of incinerator heat for building heat; sauna heat, and clothes dryer heat. (See also W74-10160) (Shaffer-FIRL)
W74-10186

PHOSPHORUS REMOVAL BY LIME ADDITION TO A CONVENTIONAL ANAEROBIC STABILIZATION FACILITY,
Environmental Protection Service, Regina (Saskatchewan). Air Pollution Control Branch.
L. J. Lechner, and E. Davis.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 570-586, 1974. 8 fig, 9 ref.

Descriptors: *Waste water treatment, *Phosphorous, *Lime, *Anaerobic digestion, *Temperature, Water quality control, Cold regions, Canada, Performance, Efficiencies, Biochemical oxygen demand, Chemical oxygen demand, Carbon, Suspended solids.
Identifiers: Anaerobic stabilization, Phosphorous removal, Carbonaceous material.

An investigation was conducted to determine the phosphorous removal capacity of three different dosages of lime in an anaerobic lagoon. Secondarily, it was hoped that a determination might be made of the effect of lime on the removal of carbonaceous material. The lime used in this study was a high calcium chemical grade hydrated lime. The efficiency of phosphorous removal at a dosage of 187.5 ppm and 100 ppm were similar, about 82 percent, and little effected by temperature. Removal efficiency at 50 ppm was considerably below the other levels. Percent BOD removal for all three dosages was similar and not above 10 percent greater than the conventional untreated anaerobic process. COD removal was also similar for all three dosage levels. Only the highest dosage produced any increase in the removal of total carbon over that of the untreated lagoon process. The high dosage removed 93 percent of the SS, while the moderate dosage removed 89 percent. The untreated lagoon and the low dosage both removed 84 percent of SS. All dosages appeared to be temperature independent in SS removal. (See also W74-10160) (Shaffer-FIRL)
W74-10187

ODORS FROM CONFINED LIVESTOCK PRODUCTION,
Oregon State Univ., Corvallis. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W74-10188

NEW MICROBIAL INDICATORS OF WASTEWATER CHLORINATION EFFICIENCY,
Illinois Univ., Urbana. Dept. of Civil Engineering.
R. S. Engelbrecht, D. H. Foster, E. O. Greening, and S. H. Lee.
Copy Available from GPO Sup Doc as EP1.23:670/2-73-082, $1.15; microfiche from NTIS as PB-234 169 $1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-73-082, February 1974. 67 p, 8 fig, 14 tab, 53 ref. EPA Project 17060 EYZ.

Descriptors: *Bioindicators, *Bacteria, Coliforms, *Yeasts, *Chlorination, *Waste water treatment, *Viruses, Public health, Water reuse, Activated sludge, Trickling filters, Resistance, Sewage bacteria.
Identifiers: Enteric viruses, Chlorine resistance, Pour plates, Acid-fast bacilli.

The coliform group of indicator organisms has a relatively low resistance to chlorine when compared to pathogens such as enteric viruses and protozoan cysts. Consequently, an effort has been initiated to find a new chlorine resistant bioindicator of wastewater chlorination efficiency. Organisms surviving chlorination of wastewater effluents to a free chlorine residual were collected for study by plating on various growth media. This procedure provided 135 chlorine resistant isolates for further examination. A yeast and two different acid-fast bacilli were found to be resistant to chlorination in the range considered necessary for the inactivation of pathogens, including viruses. One acid-fast bacillus survived 2.0 mg/l free chlorine for 67 min while the other survived 1.0 mg/l free chlorine for 15 min. The yeast resisted 1.0 mg/l free chlorine for 20 min. In comparison, a pure culture of E. coli failed to survive 5 min contact with 0.03 mg/l free chlorine. Acid-fast staining of colonies on membrane filters incubated on mineral-propionate medium, following sample pretreatment with oxalic acid and NaOH provided a selective assay technique for acid-fast organisms. Significant quantities of yeasts and acid-fast organisms were found in wastewater effluents and yeasts have been isolated from stools. The chlorine resistance and other characteristics of the yeasts and acid-fast bacilli under study suggest that they show promise as bioindicators for wastewater chlorination efficiency for the more chlorine resistant pathogens. (EPA)
W74-10189

OPTIMIZATION AND DESIGN OF AN OIL ACTIVATED SLUDGE CONCENTRATION PROCESS,
Esso Research and Engineering Co., Linden, N.J.
T. M. Rosenblatt.
Copy Available from GPO Sup Doc as EP1.23:670/2-74-004, $1.40; microfiche from NTIS as PB-234 173 $1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-74-004, February 1974. 191 p, 16 fig, 51 tab, 55 ref, 4 append. EPA Project 17070-HDA. 68-01-0095.

Descriptors: *Activated sludge, *Waste water treatment, *Separation techniques, Drying, Dewatering, *Oil wastes, Pilot plants, *Sewage disposal, Incineration, Cost analysis, *Design, *Optimization, Sewage sludge.
Identifiers: Oil-assisted dewatering, Drying secondary sewage sludge, Thickening, Gravity separation.

Laboratory and pilot plant studies are described for a new Esso-Carver Greenfield process for the disposal of sewage sludge. An oil-assisted gravity separation of the majority of the water while heating is followed by multiple effect evaporation to dryness in an oil slurry, and incineration of the dry solids. Agreement between laboratory and pilot plant results was good, indicating no scale-up problems. In the gravity separation, secondary sludges are concentrated from about 0.5% up to 5-10% solids. Solids capture of 98% or more is achieved by high shear oil-sludge contacting. Temperature dependent losses of solubilized organic carbon up to about 25% of the organic content of the feed are observed in the separated water from the oil concentration, and in the distillate from the evaporators. The process economics show an advantage of $13-32 a ton compared to the best known commercial technology: total costs are estimated at $21-39/ton of dry solids for a 189 ton/day plant processing a 50/50 mixture of primary + activated sludges to ash. A lower temperature gravity separation step could greatly reduce the economic penalty for a 25% recycle of solubilized secondary sludge, and yield an improvement of $1-12/ton of dry solids depending on plant size and sludge type. Other cost reductions in the thickening and settling steps could amount to $1-5/ton dry solids. (EPA)
W74-10192

STORAGE AND DISPOSAL OF IRON ORE PROCESSING WASTEWATER,
Michigan Technological Univ., Houghton. Dept. of Civil Engineering.
C. R. Baillod, and G. R. Alger.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-018, $1.80; microfiche from NTIS as PB-234 180 $1.45. Environmental Protection Agency, Technology Series Report EPA 660/2-74-018, March 1974. 135 p, 37 fig, 20 tab, 27 ref, 6 append. EPA Project 14040FVD.

Descriptors: *Mine wastes, Sedimentation, Hydrology, *Coagulation, Industrial wastes, Sediment transport, Impoundments, *Michigan, Lake Superior, *Iron, *Waste water treatment, *Dewatering, Waste disposal, Storage.
Identifiers: Tailings basins, Iron ore beneficiation, Taconite waste, *Thickening, Vacuum filtration.

This study was concerned with the handling of wastewater resulting from the concentration of low grade iron ore. Specific objectives were to develop tailings basin design and management criteria, to investigate methods of treating basin effluents, and to investigate transport characteristics of particulate materials contained in basin discharges. These objectives were accomplished through laboratory and field studies conducted at the tailings impoundment systems associated with two iron ore concentrating plants located in Upper Michigan. Annual water balances were formulated for the tailings system at each plant to show the relative importance of precipitation, surface outflow and seepage. Settling column and dye disper-

sion tests were employed to predict concentrations of suspended material remaining in basin effluents. The cost effectiveness of various coagulation systems for treating basin effluent was investigated. Particular attention was devoted to a study of the thickening and dewatering characteristics of the slurry produced by chemical coagulation of the basin effluent. Synthesis of alternative systems for handling tailings wastewater was hampered by a lack of information on water quality requirements for reuse within ore concentrating processes. Finally, settling column experiments in which fine tailings particles were diluted with various natural waters were conducted. (EPA)
W74-10193

COMBINED SEWER OVERFLOW ABATEMENT PLAN, DES MOINES, IOWA,
Henningson, Durham and Richardson, Inc., Omaha, Nebr.
P. L. Davis, and F. A. Borchardt.
Copy Available from GPO Sup Doc as EP1.23/2:73.170, $3.20; microfiche from NTIS as PB-234 183 $1.45. Environmental Protection Agency, Technology Series Report EPA-R2-73-170, April 1974. 311 p, 79 fig, 26 tab, 20 ref, 4 append. EPA Project 11024 FEJ. 14-12-402.

Descriptors: *Overflow, *Combined sewers, *Storm runoff, Water quality, *Waste water treatment, Rainfall-runoff relationships, Capital costs, Operating costs, *Iowa, *Biochemical oxygen demand, Waste characteristics, Water pollution sources.
Identifiers: Combined sewer separation, Combined sewer overflow abatement, Detention ponds, *Des Moines(Iowa).

Combined sewer overflows, storm water discharges, and surface waters in the Des Moines, Iowa Metropolitan Area were samples for 12 months to determine their pollutional characteristics. Various systems of separation and collection and treatment of combined sewer overflow and storm water discharges were designed, estimated and evaluated. Analyses were made of the data collected and of the various system problems encountered. The studies indicate 174,500 pounds of BOD are discharged annually from a 4,000 acre combined sewer drainage area, and 2,668,000 pounds of BOD from 45,000 acres served by separate storm sewers. Average concentrations of pollutants in storm water were 53 mg/l BOD, 448 mg/l SS, 1.78 mg/l NH3-N, 1.10 mg/l NO3-N, and 1.65 mg/l Total PO4. Average concentrations of pollutants in combined sewer overflows were 72 mg/l BOD, 329 mg/l SS, 4.79 mg/l NH3-N, 0.74 mg/l NO3-N, and 8.92 mg/l Total PO4. Several combined sewer overflow abatement projects are recommended for implementation. (Field-EPA)
W74-10194

RENOVATION OF SECONDARY EFFLUENT FOR REUSE AS A WATER RESOURCE,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
L. T. Kardos, W. E. Sopper, E. A. Myers, R. R. Parizek, and J. B. Nesbitt.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-016, $4.80; microfiche from NTIS as PB-234 176 $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-74-016, February 1974. 495 p, 134 fig, 165 tab, 112 ref, append. EPA-16080-DYJ (Formerly WPD-95-04).

Descriptors: *Waste water treatment, Filters, *Sewage effluents, *Land disposal, *Water reuse, *Phosphorus removal, Water pollution, Nitrates, Boron, Goundwater recharge, Sprinkler irrigation, Crop production, Tree growth, Oxygen diffusion, Exchangeable cations, Bray phosphorus, Nutrient removal efficiency, Monitoring, Suction lysimeters, Trench lysimeters, Piezometers, Runoff, Deep wells, Annual costs, *Pennsylvania.
Identifiers: Corn(Silage), Reed canarygrass, White spruce, Red pine, Hardwoods, *Hublersburg clay loam, *Morrison sandy loam, State College(Penn).

Sprinkler application of chlorinated secondary sewage effluent at levels of 1 or 2 in/wk during the growing season or year-round increased crop yields and forest tree growth except for red pine at the 2 in/wk rate. Harvested crops removed large amounts of nitrogen and phosphorus, the two key eutrophication nutrients. N and P content of forest foliage was increased but the nutrients were recycled through the litter. NO3-N in suction lysimeter samples at 4 feet were less than the U.S.P.H.S. limit of 10 mg NO3-N1. except in the growing season-2 in/wk red pine on Hublersburg silt loam and year-round, 2 in/wk hardwood on Morrison sandy loam, where the values were 2 to 4 times the U.S.P.H.S. limit. P conc. in the same samples was no greater than in untreated control areas and had decreased 98 to 99%. Only one deep monitoring well showed higher NO3 and Cl- conc. definitely ascribable to the effluent irrigation but still met U.S.P.H.S. drinking water standards. Recharge within one 43.5 acre site was estimated at 65 million gallons per year and resulted in lower pumping costs in two nearby University water supply wells. Annual costs of a sprinkler irrigation system to recycle sewage effluent through the land as a living filter were estimated to range from $13/EDU for 1MGD to $8/EDU for 10MGD. Data are also reported on hydrologic studies, boron studies, aeration studies, phosphorus adsorption studies and soil chemical changes. (EPA)
W74-10197

DEMONSTRATION OF THREE RECIRCULATING SWINE WASTE MANAGEMENT SYSTEMS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. R. Miner, T. E. Hazen, R. J. Smith, and G. B. Parker.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-009, $1.90; microfiche from NTIS as PB-234 179 $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-74-009, December 1973. 147 p, 48 fig, 26 tab, 29 ref. EPA Project 13040 ERR.

Descriptors: *Waste water treatment, Farm wastes, Waste disposal, *Water reuse, *Hogs, *Hydraulic transportation, *Demonstration farms, Farm lagoons, Aerobic treatment, Biological treatment, Irrigation, Odors, Nitrogen, Biochemical oxygen demand, Chemical oxygen demand.
Identifiers: *Swine wastes, *Flushing gutters, Flush tanks, Rotating biological contactors, Anaerobic lagoons, Aeration basins, Land application.

Three waste treatment systems were used to process liquid swine manure so the effluent could be reused as flush-water. Hydraulic transport was effective in removing manure from all eight buildings. Excess liquid from all three systems was applied to adjacent cropland to achieve nutrient utilization as the final disposal step. Reductions in building odors, manure handling labor, and land requirements for final effluent disposal were major goals of the demonstration. An aeration basin received the manure from two farrowing buildings with a capacity for 14 sows each. As anticipated, solids accumulated in the aeration basin. When the solids content exceeded 4,500 mg/l plugging problems became frequent in the pump and piping system. A lagoon-aeration basin system served two farrowing buildings with a capacity for 28 sows each. The system performed adequately with only minor mechanical difficulties. A lagoon-RBC system served four finishing buildings with a total capacity of 700 hogs. Frequent mechanical and biological failure resulted in removal of the RBC from use. Lagoon effluent is being used to flush these buildings with success. Repeated outbreaks of vibrionic dysentery has prompted remodelling two of the buildings and flushing in a gutter covered with slats. (EPA)
W74-10198

A DEMONSTRATION OF THERMAL WATER UTILIZATION IN AGRICULTURE,
Eugene Water and Electric Board, Oreg.
J. W. Berry, and H. H. Miller, Jr.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-011, $2.80; microfiche from NTIS as PB-234 178 $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-74-011, April 1974. 237 p, 65 fig, 39 tab, 51 ref. EPA S802032.

Descriptors: *Beneficial use, Industrial water, *Thermal water, *Water utilization, Heated water, Water pollution control, *Thermal pollution, Agriculture, *Frost protection, Irrigation water, *Soil-water-plant relationships, Soil temperature, *Water reuse, *Oregon.
Identifiers: Waste heat use in agriculture, Thermal pollution control, Soil heating, *McKenzie River(Ore).

A five-year demonstration project was conducted to determine benefits and identify harmful effects of using waste heat in condenser cooling water (90 deg F-110 deg F) for agricultural purposes. Initial phases of the demonstration emphasized the use and evaluation of warm water for spring frost protection, irrigation, and plant cooling during summer. Various row crops and fruit and nut trees were included in the evaluation. Undersoil heating was demonstrated on a 1.2 acre soil plot. Two and one half inch plastic pipes were buried 26 inches deep and 5 feet on center, connecting to 6 inch steel headers. Warm water was circulated through the grid, heating soil on which row crops were grown. A plastic greenhouse (22ft x 55ft) was constructed on a portion of the undersoil heat grid. Greenhouse crop production was thoroughly evaluated. Conclusions indicate that the greatest potential benefit of waste heat use in agriculture is in the area of greenhouse soil heating. Monetary benefits from industrial waste heat appear achievable through proper management. (Christianson-EPA)
W74-10199

THE SWIRL CONCENTRATOR AS A GRIT SEPARATOR DEVICE,
American Public Works Association, Chicago, Ill.
R. H. Sullivan, M. Cohn, J. E. Ure, and F. Parkinson.
Available from the National Technical Information Service as PB-234 175 $8.00 in paper copy, $1.45 in microfiche. Environmental Protection Agency, Cincinnati, Ohio, Technology series, Report EPA-670/2-74-026, June 1974. 92 p, 60 fig, 7 tab, 3 append. Grant No. EPA 11023 GSC (S-802219).

Descriptors: Design, *Wastewater treatment, Combined sewers, *Sewage treatment, Flow rate, *Separation techniques, Hydraulic models.
Identifiers: *Swirl concentrator, Combined sewer overflow regulation, Recovery rate, *Grit chambers, *Grit removal, Swirling(Separation).

A study was conducted by the American Public Works Association to determine the applicability of a swirl concentrator chamber to perform the functions of a grit separation and removal facility. The swirl concentrator principle was originally developed in Bristol, England, and subsequently modified and applied by the APWA to act as a combined sewer overflow regulator. The ability of the swirl flow pattern to effectively remove solids of particular sizes or specific gravities was noted during the first study. This hydraulic flow configuration was developed and adapted to effectively remove grit from either the underflow from the combined sewer overflow regulator or from domestic sanitary sewage. Hydraulic model studies were used to develop optimum design configurations. For an average flow of 0.084 m cubed/sec (3 cfs), the diameter of the unit would be 2.19 m (7.2 ft) and 1.1 m(3.6 ft) deep. The efficiency of removing grit particles of 2.65 sg and size greater than 0.2 mm will be equal to that of con-

ventional grit removal devices. The unit has no moving parts. Conventional grit washers and lifts can be employed. The complete report on studies carried out on a swirl grit removal model by the LaSalle Hydraulic Laboratory Ltd. is included as an appendix. (See also W73-05214) (EPA)
W74-10201

VISCOSITY ACTUATED PHASE SEPARATING (VAPS), FOR OIL-WATER SEPARATIONS,
Union Carbide Corp., Bound Brook, N.J. Chemicals and Plastics.
For primary bibliographic entry see Field 5G.
W74-10231

THERMOPHILIC AEROBIC DIGESTION OF ORGANIC SOLID WASTES,
Clemson Univ., S.C. Dept. of Environmental Systems Engineering.
J. F. Andrews, and K. Kambhu.
Available from NTIS, Springfield, Va 22151 as PB-222 396 Price $6.25 printed copy; $1.45 microfiche. Environmental Protection Agency Report EPA-670/2-73-061, August 1973. 76 p, 18 fig, 6 tab, 55 ref. EPA/EP-00268.

Descriptors: *Waste disposal, *Sludge disposal, *Aerobic treatment, Oxygen demand, Recycling, Biodegradation, *Waste water treatment, *Mathematical models.
Identifiers: *Thermophilic aerobic digestion.

Thermophilic aerobic digestion is proposed to treat wastewater sludge and garbage. The major reactions involved in the process are discussed. Volatile solids destruction, oxygen utilization, and carbon dioxide production are calculated stoichiometrically for both ammonia and nitrate as products of organic nitrogen oxidation. A simple procedure relates heat production to the oxygen equivalent or COD of the organic solids. Simulation studies and mathematical models employ conservative values of biological parameters. The mathematical model provides assistance in planning and conducting pilot plant studies. (Knapp-USGS)
W74-10236

ESTIMATED RAINFALL FOR DRAINAGE CALCULATIONS IN THE UNITED KINGDOM,
Transport and Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 2B.
W74-10241

SEPARATION AND RECOVERY SYSTEMS, INC., 100-GALLON-PER-MINUTE OIL/WATER SEPARATOR,
Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 5G.
W74-10248

DEVELOPMENT OF A POLLUTION-FREE CARGO TANK CLEANING SYSTEM FOR USE ON BOARD TANKERS,
State University of New York Bronx. Maritime Coll.
J. Femenia.
Available from NTIS, Springfield, Va 22151 as COM-73-11188 Price $3.75 printed copy; $1.45 microfiche. New York State Sea Grant Program Report, June 1973. 75 p, 19 fig, 7 tab, 8 ref, 2 append. NOAA Sea Grant 2-35281.

Descriptors: *Cleaning, *Oil wastes, Ships, Water pollution control, Sea water, Oily water, Pollution abatement, *Waste water treatment, Brines, Sulfate, Magnesium compounds.
Identifiers: *Oil tankers, *Magnesium sulfate.

A pollution free cargo tank cleaning system is proposed. The basic system operates in closed tanks using magnesium sulfate brine as the recirculated cleaning fluid. The effects of using this brine in lieu of seawater for washing tanks are described. The preliminary design of a practical shipboard system, including the separator, is included together with basic operating and maintenance procedures. (Knapp-USGS)
W74-10249

REFINERY EFFLUENTS NEED EFFICIENT CONTROL.
Energy Digest, Vol 3, No 1, p 37-39, January/February, 1974. 2 tab.

Descriptors: *Effluents, *Oil, Flocculation, *Waste water treatment, Sewage treatment, Activated sludge, Aeration, Separation techniques, Gas, Water pollution, Sulphur, Legislation, Biological treatment, Water quality.
Identifiers: *Refineries, Effluent control.

Refineries share the major problem of effluent control. Three components make up effluent water: process steam, mixed with oil vapors which condense and separate into oil and water; rain water in drainage areas which must be treated to separate the oil they have picked up enroute; and water employed for cooling purposes. These three water streams are generally treated separately, by gravity separation, flocculation with chemicals, biological treatment, activated sludge treatment, or air flotation plants. The type and degree of water treatment required is dependent upon the volume of the water, the quality, and the size of the receiving water. In addition, radioactive material can be a problem. Considered too, are problems relating to pollution by the gas industry and lack of effective sulphur legislation. (Prague-FIRL)
W74-10274

EFFLUENT WATER TREATMENT BY CONTACTING WITH PLANT TISSUE.
Hitachi Ltd., Tokyo (Japan).
Netherlands Patent 7312-237. Issued March 3, 1974. Derwent Netherlands Patents Report, Vol 5, No 12, p 4, March, 1974.

Descriptors: *Patents, *Effluents, *Waste water treatment, *Plant tissues, Heavy metals, Equipment, Waste removal, Water purification, Absorption, Detergents, Alkylbenzene sulphonates.

Water is contacted, such as in a column or a stirred vat, with plant tissue (stalks and leaves of barley, rice, wheat, sugar cane, soya beans, saw dust, shavings, twigs of cut woods, pampas grass, nettles, wisteria). The process absorbes impurities and gives excellent removal of heavy metal compounds, basic and direct dyestuffs and surfactants such as alkylbenzene sulphonates. (Prague-FIRL)
W74-10275

TREATMENT OF AQUEOUS WASTE STREAMS CONTAINING A WATER-SOLUBLE SULFIDE COMPOUND.
Universal Oil Products Co., Melbourne (Australia).
Australian Patent 444,809. Issued February 7, 1974. Official Journal of Patents, Trade Marks and Designs, Vol 44, No 4, p 349, February 7, 1974.

Descriptors: *Patents, *Aqueous solutions, *Sulfides, Oxidation, Catalysts, Effluents, Liquids, Streams, *Waste water treatment, Solubility.
Identifiers: *Waste streams, Water-soluble compounds, Polysulfides, Australia.

A method for the treatment of aqueous waste streams containing a water-soluble sulfide compounds was comprised of three steps. These are: (1) to contain the aqueous waste stream and oxygen in an amount less than 0.5 moles of 02 per mole of the sulfide compounds with a first solid oxidizing catalyst at oxidizing conditions, including a relatively low pressure and temperature, sufficient to form a first effluent stream containing a water-soluble polysulfide; (2) to contact the first effluent stream and oxygen with a second solid oxidizing catalyst at oxidizing condition, including a temperature greater than the melting point of sulfur and pressure to maintain a portion of the first effluent stream in liquid phase; and (3) to separate the liquid sulfur from the second effluent stream to produce a treated aqueous stream which is substantially free of the sulfide compound. (Prague-FIRL)
W74-10276

DEPOLLUTION TECHNIQUES AND MANAGEMENT IN AN OIL REFINERY,
Indian Inst. of Petroleum, Dehra Dun.
S. Chakravarty, and H. K. Mulchandani.
Chemical Age of India, Vol 24, No 12, p 819-826, 1973. 2 fig, 5 tab, 6 ref.

Descriptors: *Oil, *Waste water treatment, *Industrial wastes, *Water pollution, Effluents, Biochemical oxygen demand, Flocculation, Flotation, Suspended solids, Lagooning, Sulphur, Air pollution, Noise pollution, Costs, Contaminants, Hydrogen ion concentration.
Identifiers: *India, Oil refineries.

With increasing demand for petroleum products and an expansion of the refining capacity of India, associated effects of pollution occur. Legislation is now being formulated to stipulate and regulate levels of acceptable pollution. Discussed are waste water management, air pollution, and noise pollution. Refinery waste streams systems can be classified as: sanitary water systems, clean water, oily water, ballast water systems, and foul and oily process water systems. The waste water flow scheme for a refinery includes pH control, an API separator for the removal of oil, flocculation/flotation methods for the removal of suspended solids and oil, and a biological treatment system for the reduction of BOD. Treatment and disposal of effluent leads to the following considerations: sludge and its disposal, and acid sludge disposal by either burning, thermal decomposition and sulphur recovery, lagooning, or neutralization and dumping. Apart from the waste purification system, plant design is discussed in terms of economics and reducing the quantity of either waste water or contaminant. (Prague-FIRL)
W74-10280

FILTRATION MECHANISMS DURING THE REMOVAL OF CONTAMINANTS FROM NITRIC ACID,
Geological Survey, Tallahassee, Fla.
K. V. Rybakov, V. P. Kovalenko, and L. M. Rozanova.
International Chemical Engineering, Vol 14, No 2, p 263-264, April, 1974. 2 fig, 2 ref.

Descriptors: *Waste water treatment, *Filtration, *Sludge, *Clarification, Simulation, Mathematical studies, Investigations, Nitrogen, *Filters, Pores, Removal, Wastes.
Identifiers: *Nitric acid, Sludge formation, Filter media.

The filtration process can proceed, even with complete clogging of the pores, with sludge formation. In order to determine the filter surface area for clarification by filtration, it is necessary to establish the mechanisms which describe the process under given specific conditions. Illustrated are graphic methods for calculating the nitric acid filtration process using various filter media. The process is found to take place by a sequential two-stage mechanism. This involves first, the partial clogging of the pores of the filter media and second, the sludge formation. (Prague-FIRL)
W74-10281

DEHYDRATION OF SOLIDS BY CHEMICAL FRACTIONATION.
Boeing Co., Seattle, Wash.
For primary bibliographic entry see Field 5G.
W74-10282

TREATMENT OF WASTE WATER,
Phillips, Ormonde and Fitzpatrick, Melbourne (Australia).
M. Zuckerman, and A. Molof.
Australian Patent 444,933. Issued February 7, 1974. Official Journal of Patents, Trade Marks and Designs, Vol 44, No 4, p 375, February 7, 1974.

Descriptors: *Patents, *Waste water treatment, Organic matter, *Hydrolysis, *Solubility, Molecular weight.

A process for the treatment of non-biologically treated waste water containing high molecular weight soluble organic materials is comprised of two steps. These are: hydrolyzing the high molecular weight soluble organic material in the waste water to yield a hydrolyzed product containing low molecular weight soluble organic materials; and removing at least part of the soluble low molecular weight organic material from the waste water. (Prague-FIRL)
W74-10283

WATER DESALTING,
For primary bibliographic entry see Field 5E.
W74-10284

A SOLUTION TO A SOLUTION PROBLEM.
Effluent and Water Treatment Journal, Vol 14, No 2, p 103-104, February, 1974. 2 fig.

Descriptors: *Effluents, *Industrial wastes, *Costs, *Standards, Water pollution, *Treatment facilities, Lime, Design criteria, Maintenance, Water pollution control, *Waste water treatment.
Identifiers: Solution Silo.

Problems of design for treatment of effluents from industry must take into account costs and rising standards of pollution control. For example, acid effluents must be neutralized and a common method of treatment is to mix a solution of lime or soda ash in correct proportion with the effluent. The treatment plant required for this type of process is a nonproductive capital investment. J. T. Scotney Limited of Hull has developed a packaged unit called the composite Solution Silo. This consists of a cylindrical vessel, the upper section being the powder silo and the lower section forming an insulated plant room, complete with lockable double doors and interior lighting. Designs have built-in alarm systems to provide remote warning of any malfunctions. Its purpose is to rationalize industrial plant and reduce extraneous installation, commissioning, and maintenance costs. (Prague-FIRL)
W74-10286

SONOCO OFFERS NEW APPROACH TO SULPHITE CHEMICAL RECOVERY.
Paper Trade Journal, Vol 158, No 14, p 22-23, April 8, 1974. 1 fig.

Descriptors: *Sulphite liquors, *Water reuse, Aluminum, Sodium, Water pollution, Chemistry, Water streams, Pulp and Paper industry, *Pulp wastes, Industrial wastes, Sulphur, Organic matter, *Waste water treatment.
Identifiers: *Residual liquors, Solid state liquors, *Recovery(Chemicals).

A significant development was made towards solving the problem of pollution and costs by recovering sodium base spent sulphite liquors and marketing products produced from them. This spent liquor was acidified and the organic acids extracted. The residual liquor was also sold as a salt cake substitute. Burning of the liquor was done in the solid state in conventional equipment, a less costly process than ordinary recovery furnaces, using new aluminum complexes. A flow diagram explains the many steps of the process. Basic chemistry and required equipment are also detailed. The significant results of this system are that a major portion of the chemicals required in the pulping process are reusable; no significant odors are generated from the pulping or the recovery processes; a new basic chemistry for recovery of sodium base sulphite pulping liquor has been tested on a plant scale; the process is economically competitive. This sulphite chemical recovery system should be applicable to any independent sodium base neutral sulphite semi-chemical pulp mill and for sodium base sulphite pulp mills practicing full chemical cooking. (Prague-FIRL)
W74-10287

THE EFFECT OF DISSOLVED HYDROCARBON GASES IN SURFACTANT SOLUTIONS ON FROTH FLOTATION OF MINERALS,
Henry Krumb School of Mines, New York.
P. Somasundaran, and B. M. Moudgil.
Journal of Colloid and Interface Science, Vol 47, No 2, p 290-308, May, 1974. 5 fig, 1 tab, 23 ref.

Descriptors: *Organic compounds, Industrial wastes, *Gases, *Surfactants, *Froth flotation, Minerals, Surface tension, Flotation, Methane, Adsorption, *Waste water treatment, Aqueous solutions.
Identifiers: Salting-out effects, Hydrophobic band formation.

Surface tension properties of hydrocarbon saturated solutions have been measured and indicated absorption of the gas molecules at the solution/air interface. Selective effects of the dissolved hydrocarbons on froth flotation of minerals are discussed on the basis of possible changes in the properties of the solution surface and the mineral/solution interface. Mechanisms responsible for the effects on flotation were demonstrated; for example, methane dissolved in sodium dodecylsulfonate collector solutions was found to increase the flotation of alumina by 10 to 30 percent. Flotation of quartz or hematite was not affected by the presence of dissolved methane or butane. A new automated constant-pressure apparatus for dissolution studies the solubility of gases to be lower in surfactant solutions than in water when the surfactant concentration was low, and higher than in water when the concentration was high. This is explained on the basis of the predominance of the 'salting-out' effect at lower surfactant concentrations and the hydrophobic bond dormation between the hydrocarbon molecule and the surfactant chains at higher concentrations. (Prague-FIRL)
W74-10288

CANADA: SEVERE PROBLEMS.
Paper Review of the Year, p 74, 76-78, 80, 101, 1973. 1 tab, 1 ref.

Descriptors: *Pulp and paper industry, *Canada, Water pollution control, *Costs, Legislation, *Pulp wastes, Aeration, Lagoons, Monitoring, Fish, Water quality control, Recovery, Equipment, Machinery, *Incineration, *Waste treatment, *Waste water treatment.
Identifiers: *Fluidized bed reactor, Waste fibers.

Canadian pulp and paper industry has been heavily taxed and has had severe economic problems due to increasing costs of pollution control measures defined by governmental legislation. Improvements described include a fluidized bed reactor which incinerates all non-usable wastes together with general mill debris and sludge from the effluent system of the mill, without creating atmospheric pollution. The reclamation of waste fiber materials is described. Liquid waste is aerated in collecting lagoons. Monitoring stations will check the quality of water. The mixture of effluent waters and river water will be simulated in a fish aquarium to check water quality. A recovery furnace and boiler will be installed. Specific equipment and machinery for these and other processes are described. (Prague-FIRL)
W74-10289

WASTEWATER SYSTEM ALTERNATES: WHAT ARE THEY...AND WHAT COST,
Anderson-Nichols and Co., Boston, Mass. Environmental Sciences Div.
R. P. Monti, and P. T. Silbermann.
Water and Wastes Engineering, Vol 11, No 5, p 40-48, 75, May, 1974. 10 fig.

Descriptors: *Waste water treatment, *Ozonation, *Biochemical oxygen demand, Aeration, Filtration, Phosphates, Effluents, Standards, Chemical precipitation, Aluminum, Salts, Legislation, Navigable waters, *Alternative planning.
Identifiers: *Zero discharge, *Phosphorus removal.

Objectives and actions are described for achieving zero discharge and effecting better waste water treatment methods. To achieve the high degree of BOD reduction and nutrient removal to reach required discharge levels, a two-stage chemical precipitation with aluminum and ferric salts, and three-stage aeration followed by sand filtration, carbon column filtration, disinfection, and final effluent aeration is recommended as a waste water treatment. Phosphorus removal systems are discussed and a chemical system of removal was agreed upon as most efficient. Ozonation and its advantages and potentials are also summarized. All of the waste water treatment processes outlined are facilities oriented to comply with the 1985 discharge limitations to navigable waters mandated by Congress. (See also W74-09718) (Prague-FIRL)
W74-10290

PLANT TREATS WASTES FROM AIRCRAFT ENGINE TESTING.
Water and Pollution Control, Vol 112, No 3, p 34-36, 39, March, 1974. 2 tab.

Descriptors: *Industrial wastes, *Effluents, Toxicity, Inorganic matter, Alkalines, Acids, Chemical wastes, Tanks, Recycling, Equipment, Control, *Treatment facilities, *Waste water treatment, *Canada.
Identifiers: Chromates, Cyanide, Phosphoric acid.

The expansion of facilities at Air Canada, Dorval, Quebec included the expansion of the overhaul and maintenance building where jet engines were to be serviced. This necessitated an effluent handling system designed to deal with toxic inorganic wastes from metal stripping, cleaning, and plating processes. Wastes stemmed from two sources, batch solutions into which the metal parts were dipped, and rinse waters. They consisted of cyanides, alkaline permanganates, caustic soda, and a variety of acids. Due to the variety of processes, chemical solutions, and tanks, recycling systems were not economically practical and a destruction treatment was necessary. Specifically treated were chromate wastes, cyanide wastes, solutions containing hydrofluoric and phosphoric acids, alkaline permanganates, concentrated general acids, and concentrated alkalies. Equipment is described. All tanks have overflow pipes, controlled by continuous automatic treatment panels located on the floor above. (Prague-FIRL)
W74-10291

WHAT'S NEW IN SLIME AND DEPOSIT CONTROL,
A. W. J. Dyck.
American Paper Industry, Vol 56, No 6, p 16-17, May, 1974. 1 tab.

Descriptors: *Slime, *Pulp and paper industry, *Mercury, Aquiculture, Fish, Legislation, Products, Pulp wastes, Waste water treatment.
Identifiers: *Slimicides, Slime control agents.

Slimicides are a part of the pulp and paper mill process and previously were mercurial compounds. However, mercurials were found a threat to fish and other aquatic animals as well as dangerous to mill personnel. Non-mercurials which replaced these as slime control agents were not as effective. More efficient biocides are being sought; described are four companies' products--Merck's Metasol J-26, Nalco's products, Dow's Slimicide XD-7287L, and Betz's Slimicide DE-508. (Prague-FIRL)
W74-10293

CONFERENCE PAPERS, NATIONAL DAIRY HOUSING CONFERENCE.
Conference held at Michigan State University, East Lansing, February 6-8, 1973. American Society of Agricultural Engineers, St. Joseph, Michigan Special Publication SP.01-73, 1973. 469 p, 53 fig, 17 tab, 69 ref.

Descriptors: *Dairy industry, *Farm wastes, *Waste water treatment, *Waste disposal, *Waste storage, *Environmental control, Legal aspects, Regulation, Air pollution, Water pollution, Economics.
Identifiers: Free-stall housing, *Stall barns, Composting.

The National Dairy Housing Conference was an attempt to bring appropriate disciplines together to focus on the subject of dairy housing. Emphasis was on practical information for use by people in the field. Subjects included: free-stall housing, stall barns, herd health, environmental control, codes and regulations, milking systems planning, feeding systems, calf and youngstock housing, milkhouse and milking parlor wastes, and manure management. (See W74-10298 thru W74-10312) (Janssen-East Central)
W74-10297

CONVENTIONAL STALL BARNS WITH GUTTER GRATES AND LIQUID MANURE STORAGE,
Dept. of Agricultural Engineering. Minnesota Univ., Minneapolis.
D. W. Bates.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973. p 99-107, 1973. 5 fig, 5 ref.

Descriptors: *Waste storage, *Liquid wastes, *Dairy industry, Cattle, Ventilation, Odor, *Minnesota, *Farm wastes, Waste water treatment.
Identifiers: *Stall barns, *Manure storage tanks, Gutter grates.

Dairymen in cold climates have begun to employ manure storage tanks 9 months of the year. For the new dairy barn, a practical place to store manure is directly beneath the barn for removal as a liquid. With this method the wall of the manure tank can act as a foundation for the barn and the floor of the barn can serve as the cover for the manure tank. By using gutters with grated bottoms, manure and urine drop directly into the storage pits, and the need for a gutter cleaner is eliminated. A garden rake may be used to work through manure that hangs on the grates. Typical construction details for such a system are outlined. Already existing dairy barns usually have to employ an external manure tank. The gutter cleaner elevator can be modified so manure will drop directly into the tank. Careful planning and management is essential for the success of either system. (See also W74-10297) (Janssen-East Central)
W74-10298

SUMMER ENVIRONMENTAL MODIFICATION SYSTEMS FOR DAIRY COW HOUSING IN THE UNITED STATES,
Agricultural Research Service, Columbia, Mo.
L. Hahn, D. D. Osburn, and J. D. McQuigg.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973. p 134-141, 1973. 3 fig, 12 ref.

Descriptors: *Dairy industry, *Environmental control, Productivity, United States, Odor, Moisture, Ammonia, Air conditioning, Costs, *Seasonal.
Identifiers: *Summer environmental modification systems, Housing, Evaporative cooling, Partial air conditioning.

Protective shelters for dairy cows are adequate in many areas of the United States, considering the normal levels of milk production and the relatively small regions of adverse summer climates. However, for high-producing cows in hot-dry or hot-humid climates, milk-production losses which are a result of the direct influence of climatic factors can be a severe problem. Managers of dairy herds in such areas should consider adopting an environmental modification system for improved production. The form of modification adopted must be rationally selected; not all systems are profitable. The optimum environment for maximum production is not the economic optimum for current costs and returns. Of the alternative systems considered, evaporative cooling appears to have the most potential for application in areas with hot summer climates. (See also W74-10297) (Janssen-East Central)
W74-10299

POTENTIAL ECONOMIC IMPACTS OF STATE POLLUTION CONTROLS ON DAIRY FARMS,
Michigan State Univ., East Lansing. Dept. of Agricultural Economics.
L. J. Connor, and J. B. Johnson.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973. p 182-191, 1973. 1 tab, 4 ref.

Descriptors: *Economic impact, *Legal aspects, *Dairy industry, *Farm wastes, *Waste treatment, *Waste disposal, Water pollution, Air pollution, Feed lots, Cattle, Michigan.
Identifiers: *State pollution controls, State statutes.

Changes in livestock production and concern for the environment have resulted in enactment of varied state statutes concerning pollution problems associated with livestock production facilities and waste disposal areas. The impact of state legal controls varies according to the type of legal control enacted, herd size, housing-waste handling systems, and specific location variables. A Michigan study illustrates the varying impacts upon dairy farms that would accrue with specific herd size and housing-waste handling systems for each of three selected legal pollution controls. Individual dairy farmers are advised to exercise caution in making any expansion or adjustments in their business, and in evaluating any potential environmental problems in their farms. (See also W74-10297) (Janssen-East Central)
W74-10300

DESIGN OF MILKING CENTER WASTE MANAGEMENT SYSTEMS,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
R. T. Lorenzen, and R. W. Guest.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 349-358, 1973. 2 fig, 1 tab, 11 ref.

Descriptors: *Dairy industry, *Design, *Farm wastes, *Waste treatment, *Waste disposal, *Waste storage, Lagoons, Biochemical oxygen demand, Septic tanks, Milk.
Identifiers: *Milking center, *Waste management systems, Aeration ponds, Effluent quantity, Settling tank.

Design data from several recent studies are applied to the collection, treatment, storage, and disposal systems for handling milking center wastes. Included are parameters for quantity, physical constituents, and biological degradation of milk room wastes, milking parlor wastes, and human wastes. Point source and composition of milking center effluent are outlined. Milking center effluent routing options are discussed. Existing circumstances at the site must be the paramount consideration in selection of a waste handling option. (See also W74-10297) (Janssen-East Central)
W74-10301

LAGOON DISPOSAL OF DAIRY WASTES IN FLORIDA,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
R. A. Nordstedt, and L. B. Baldwin.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p. 359-370, 1973. 1 fig, 1 tab, 6 ref.

Descriptors: *Lagoons, *Farm wastes, *Waste disposal, *Waste storage, *Waste water treatment, *Dairy industry, *Florida, Climates, Soil types, Water pollution, Odor, Sludge.
Identifiers: Sand trap, Anaerobic lagoon, Storage pond, Dispersal field.

The dairy industry in Florida is characterized by large milking herds. The type of waste management systems used are influenced by the amount of labor and management input and by the climate and soils of Florida. The most common waste management system used is the lagoon system, consisting of a sand trap, anaerobic lagoon, detention pond, and dispersal field. The dimensions, volumes, efficiency and maintenance requirements of each of the four major components of the lagoon systems are discussed. The Florida Department of Pollution Control has set guidelines for the use of lagoons in Florida and lagoon construction has accelerated in the state. The lagoon system is successful in Florida due to climatic and soil conditions but may not be successful in other states. Potential ground water pollution must be carefully considered. (See also W74-10297) (Janssen-East Central)
W74-10302

PROGRESS REPORT--AEROBIC AND ANAEROBIC LAGOONING OF DAIRY AND MILKING WASTES,
Clemson Univ., S.C. Dept. of Agricultural Engineering.
C. L. Barth, H. P. Lynn, and W. L. Northern.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p. 371-380, 1973. 5 fig, 5 tab, 6 ref.

Descriptors: Lagoons, *Aerobic conditions, *Anaerobic conditions, Dairy industry, *Farm wastes, *Waste water treatment, Sludge, Algae.
Identifiers: *Dairy wastes, *Milking wastes, *Lagoon simulators, Volatile solids.

A progress report is presented on the lagooning of dairy wastes. One objective was to evaluate the feasibility of the no-discharge, anaerobic lagoon as a treatment facility for all dairy production wastes in a warm climate. Results of various research reports are compared to results obtained through use of six lagoon simulators. Among the results were these: (1) Highest percent reductions of volatile

solids were about 51% and 15% for the dairy manure wastes at the operating temperatures of 24.3 C and 11.5 C, respectively, (2) For the parlor wastes, maximum reduction percentages were about 63% and 16% at temperature levels of 24.6 C and 11.0 C. The increase of the higher over the lower operating temperature level approximates the rule of thumb that an increase of 10 C in temperature doubles the biological activity rate, (3) No apparent difference existed in the rate of sludge buildup from the manure waste at the two operating temperatures, (4) Using the range of .135 to .18 ft.3 of sludge per lb. of V.S. added and the figure of 7.9 lb. V.S./100 lb. cow/day would produce 390-520 ft.3 of sludge per year, (5) Each cow produced six gallons of parlor waste, thus producing .025 to .05 ft. of sludge per day of parlor wastes. (See also W74-10297) (Janssen-East Central)
W74-10303

IRRIGATION DISPOSAL OF MILKING CENTER WASTES,
Missouri Univ., Columbia. Dept. of Agricultural Engineering.
R. E. Phillips, M. R. Peterson, and R. M. George.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p. 381-388, 1973. 2 fig, 2 tab, 7 ref.

Descriptors: *Irrigation, *Waste water treatment, *Waste storage, *Waste disposal, *Farm wastes, *Dairy industry, *Lagoons, Aerobic conditions, Anaerobic conditions, Water pollution.
Identifiers: *Milking Center, *Soil plant filter, Volatile solids.

The use of irrigation systems to distribute milking center wastes to a soil-plant filter is an effective method of both waste disposal and pollution prevention. An anaerobic lagoon is recommended for collecting and storing milking center wastes. The type of irrigation system selected should be based on size operation, soil type, terrain encountered on the soil plant filter, available capital, and the manager's preference. The four types of surface irrigation suited to disposal of liquid wastes are: controlled flooding, furrow irrigation, border irrigation, and corrugation irrigation. (See also W74-10297) (Janssen-East Central)
W74-10304

SOLID MANURE HANDLING FOR DAIRY CATTLE,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
J. C. Converse, C. O. Cramer, T. J. Brevik, G. H. Tenpas, and D. A. Schlough.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 389-397, 1973. 5 fig, 5 ref.

Descriptors: *Dairy industry, *Cattle, *Solid wastes, *Liquid wastes, *Farm wastes, Operations research management, Waste storage.
Identifiers: Manure stacking, Bunker.

Solid manure research activities, management techniques, and storage problems are discussed. Two types of storage facilities are described. One is a bunker type storage structure for solids with a detention pond for liquids. The other system consists of two storage units serving 28 and 26 cows each. One is a pivoting elevator which is an extension of the barn cleaner while the other one is a thrower which places the manure in a windrow. The liquids flow into detention ponds. Several field type units using low cost limestone or shale bases are also being investigated. (See also W74-10297) (Janssen-East Central)
W74-10305

MANAGING BARNYARD RUNOFF FOR DAIRY CATTLE,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
J. D. Converse, C. O. Cramer, T. J. Brevik, C. B. Gilbertson, and G. H. Tenpas.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 398-403, 1973. 2 fig, 1 tab, 4 ref.

Descriptors: *Water storage, *Agricultural runoff, *Dairy industry, *Waste disposal, Cattle, Irrigation, Water pollution sources, *Wisconsin.
Identifiers: *Waste management.

Runoff control facilities, installed at two Wisconsin farms, are described and the chemical and physical characteristics of the runoff are given. The three requirements for control of runoff are separation of solids, storage of runoff liquids, and a disposal area. Each of these farms met these requirements in a similar manner, constructing a settling terrace, a settling basin, a porous dam, and a detention pond. Among conclusions and recommendations are the following: (1) Flow velocities in the terrace or basin should be less then 1 fps with detention times greater than 1 hour. (2) The slope of the settling terrace must be essentially level to avoid a build-up of solids near the porous dam. (3) Removal of solids from the settling terrace soon after accumulation is necessary to maintain storage capacity for the next storm. (4) In Wisconsin, the capacity of the detention pond should be equal to 8 to 10 inches of runoff from the watershed because of winter precipitation. (5) Detention ponds should be located in impermeable soil so as to eliminate ground water pollution. (6) Detention pond slopes should be 3:1 to 6:1 with an 8 foot wide top on the berm. Ponds should be fenced for safety.(7) Just before freeze up in late fall, the liquid level in the detention pond should be lowered to provide storage for winter and early spring runoff. (See also W 74-10297) (Janssen-East Central)
W74-10306

AGITATING, PUMPING, AND INJECTING LIQUID MANURE,
Starline, Inc., Harvard, Ill.
A. K. Gillette.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 404-408, 1973.

Descriptors: *Waste disposal, *Liquid wastes, *Farm wastes, *Pumping, Waste storage, Pumps, Centrifugal pumps.
Identifiers: *Agitation, *Soil injection, Plowing, Disking, Agitator pump, Chopper pump, Vacuum pump, Auger.

Manure collected and stored in pits or tanks usually must be agitated prior to emptying or pumping. This may be accomplished by use of an agitator pump, a 'chopper' pump, or a vacuum type tank spreader. Each of these methods usually transports the liquid manure into a tank spreader used for depositing the manure onto the land's surface. The use of centrifugal pumps and augers is discussed but not encouraged. Soil injectors may be attached to the tank spreader, discharging the liquid manure into furrows and covering them up. Plowing and disking are discussed as means for obtaining similar results. Soil injection best achieves elimination of odor and runoff pollution. 'Plow-down' rates next and disking rates last. All these methods are better than surface spreading for prevention of runoff and for odor control. (See also W74-10297) (Janssen-East Central)
W74-10307

MIXING AND HANDLING OF LIQUID DAIRY CATTLE MANURE,
Guelph Univ., (Ontario). School of Engineering.
J. Pos, and H. E. Bellman.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 409-418, 1973. 1 tab.

Descriptors: *Dairy industry, *Farm wastes, *Waste storage, *Aerobic treatment, *Liquid wastes, Nitrogen, Chemical oxygen demand, Biochemical oxygen demand, Mixing, Handling, Slurries, Odor, *Canada, *Waste water treatment.
Identifiers: Manure pumps, Agitation, Total solids, *Ontario(Canada).

A largely unsuccessful attempt was made in Ontario to evaluate several methods of agitating large quantities of liquid dairy manure and to investigate several possibilities of aerobic treatment to control odors in storage. The basic plan was to use 4 pipelines to each of 2 storage tanks; 3 for pumping manure into the bottom of each tank and a return line to the sump. Stones and wood shavings got into the system creating blockage problems. Another time, a four inch plastic pipe burst emptying the liquid manure into the barn and into a highway ditch. During the winter the agitator pump froze. Data recorded December, 1972 - January, 1973 revealed daily production of diluted manure for 104 dairy cows was 225 cu ft of manure slurry and 108 cu ft wash water from the milk room and milking parlour. Eventually the amount of washwater was reduced, but the total diluted manure production of 3.19 cu ft per cow still exceeded the design specifications of 2 cu ft per cow. Analyses during this time for NH4, Org. N, Total N, BOD, and COD were made. In January of 1973, the tank had 20,474 cu ft of manure with a 4-inch thickness of frozen manure on the surface. On the basis of total solids and content, it appeared that a reasonable mix of suspended solids below the frozen crust was obtained after 30 minutes of mixing. Further observations and analyses are continuing. (See also W74-10297) (Janssen-East Central)
W74-10308

FLUSHING SYSTEMS FOR FREE-STALL DAIRY BARNS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
R. K. White, and R. M. Porter.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 419-428, 1973. 7 fig, 3 tab.

Descriptors: *Farm wastes, *Dairy industry, Automation, Chemical oxygen demand, Biochemical oxygen demand, *Ohio, *Waste water treatment.
Identifiers: *Flushing systems, Free-stall dairy barns, Total solids, Volatile solids.

A new dairy science center was installed at the Ohio State University with a flushing system for manure handling. A description of the facility is given. Two nine hundred gallon tanks with vertical sluice gates were used to discharge the flushing water. Peanut hulls were substituted for straw as bedding to allow the manure slurry to be discharged into the Columbus sewer system. Characteristics of the manure slurry, estimated daily water use, and manure output are tabulated. The flusing system will allow automation of a dairy facility and will reduce labor costs. (See also W74-10297) (Janssen-East Central)
W74-10309

LIQUID COMPOSTING OF DAIRY COW WASTE,
De Laval Separator Co., Poughkeepsie, N.Y.
B. Hoffman, and L. S. Crauer.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 429-440, 1973. 4 fig.

Descriptors: *Farm wastes, *Dairy industry, *Cattle, *Waste disposal, *Waste treatment,

*Waste water treatment, Water pollution, Aerobic bacteria, Thermophilic, Ammonia, Biochemical oxygen demand, Chemical oxygen demand.
Identifiers: *Composting, *Licom System.

Surface water and groundwater can be contaminated by manure through runoff and infiltration. A liquid composting system (Licom), deodorizes, pasteurizes, and biologically decomposes dairy cattle wastes with the use of digestion tanks and bacteria. Several modes of Licom System operation are available. Effluent from Licom I is completely stabilized and pasteurized and can be stored for long periods before returning it to the land. The Licom II is a continuous system and operates more efficiently than Licom I. Licom III is also a continuous system and offers a method of separating the liquid and solid waste for discharge of the liquid into surface waters. The Licom III method efficiently met the New York State standards for effluent released into surface waters. The dry residue from Licom III may be used as a soil conditioner or as bedding in the barn. (See also W74-10297) (Janssen-East Central)
W74-10310

SOLID COMPOSTING OF DAIRY MANURE,
Agricultural Research Service, College Park, Md.
G. B. Willson, and J. W. Hummel.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 441-459, 1973. 12 fig, 2 tab. 9 ref.

Descriptors: *Dairy industry, *Farm wastes, Aeration, Moisture, Chemical oxygen demand, Aerobic bacteria, Nitrates, Ammonia, Permeability, Thermophilic bacteria, *Waste water treatment.
Identifiers: *Composting.

Studies were undertaken to develop design criteria for composting operations. Aeration data were obtained from tests in small bench composters, and in one-half ton capacity bins. These data were substantiated by the composting of dairy manure in a mechanized channel. It was determined that ideally the aeration rate would be varied during the process in the following sequence: 1. During the warmup stage of the process, aeration would be applied at increasing rates in the low part of the temperature limiting range. 2. When thermophilic temperature is reached the aeration rate would be increased to the top of the temperature limiting range. If some drying is desirable, a higher aeration rate would be selected. 3. As the level of activity decreases the rate of aeration would be reduced to prevent cooling. This operating procedure will keep temperatures up until desired degree of decomposition is reached. (See also W74-10297) (Janssen-East Central)
W74-10311

WASTE MANAGEMENT REGULATIONS AND PROPOSALS,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
W. C. LaVeille.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 460-469, 1973.

Descriptors: *Federal Water Pollution Control Act, *Farm wastes, *Feed lots, *Regulation, *Legal aspects, Environmental control, Water pollution sources, Permits, Cattle, Hogs, Poultry, *Water quality standards.
Identifiers: *Waste management.

The establishment, organization, and activities of the Environmental Protection Agency are discussed. The history of federal water pollution control is traced from the 1886 River and Harbor Act to the Federal Water Pollution Control Act of 1972. It is felt that this new law will bring a profound and far-reaching change to the system of pollution control because it (1) establishes effluent limitations, (2) establishes higher standards of pollution control, (3) creates a national permit program and (4) establishes tough penalties to enforce compliance. The most immediate concern of those involved in agricultural production activities is how the permit program will affect them. Proposed rulemaking excludes discharges from agricultural and silvicultural activities from NPDES (National Pollutant Discharge Elimination System) requirements with the exception of large feedlots, certain types of hatcheries and fish farms, and return flow from some medium- and large-sized irrigation systems. Although owners and operators of the excluded point sources are not required to obtain an NPDES permit, they must comply with the other requirements of the Act, including any applicable effluent guidelines; standards of performance; toxic effluent standards or prohibitions; or pretreatment standards. (See also W74-10297) (Janssen-East Central)
W74-10312

ANNUAL LITERATURE REVIEW: ADMINISTRATION, SYSTEMS ANALYSIS,
Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 6A.
W74-10322

WATER PURIFICATION - USING ELECTROLYSIS TO RELEASE OXYGEN,
S. H. McMenamin.
French Patent 7,107,184. Issued September 25, 1973. French Patent Abstracts, January 31, 1974.

Descriptors: *Patents, *Water treatment, *Disinfection, *Waste water treatment, *Electrolysis, Water purification, Oxygen.
Identifiers: Reduction, *Electrolytic purification.

A reduction process for the electrolytic purification of water is described. A sufficient amount of electrolyte is added to the water to make it conductive, and the water passes a pair of electrodes. A direct current releases a predetermined volume of oxygen at the cathode to injure microorganisms in the water. (Merritt-FIRL)
W74-10347

FILTER - FOR CLARIFYING NATURAL AND WASTE WATERS,
Leningrad Communal Agriculture Academy Research Inst. (USSR).
E. G. Petrov, Z. Ya. Gorodisher, and M. G. Novikov.
Soviet Patent 376,104. Issued July 6, 1973. Soviet Inventions Illustrated, January 24, 1974.

Descriptors: Effluents, Water treatment, *Filtration, Equipment, *Patents, *Waste water treatment, *Filters.
Identifiers: *Clarification.

A filter for clarifying natural and waste waters is described which includes a body with a filtering charge, system of entry and exit, and vibrators. The degree to which the filter medium can clean the waters is increased and consumption of wash water is reduced by establishing vibrators directly in the first layers of the filter medium commensurate with the direction of liquid flow. Water comes in through the distribution system and is fed to the charge of filter material. The clean water runs through the collector and pipe. As wash water is admitted through the system, the vibrators are switched on, thus helping to dislodge the entrapped impurities. The wash water flow is directed upwards through the entire thickness of the bed, taking the impurities with it. The rate of feed is 4-5 liters/sec/square meter. (Merritt-FIRL)
W74-10348

FULL-SCALE TESTING OF A WATER RECLAMATION SYSTEM,
Central Contra Costa Sanitary District, Walnut Creek, Calif.
G. A. Horstkotte, D. G. Niles, D. S. Parker, and D. H. Caldwell.
Journal Water Pollution Control Federation, Vol 46, No 1, p 181-197, January 1974. 3 fig, 10 tab, 17 ref.

Descriptors: Water treatment, *Pilot plants, *Coagulation, *Sedimentation, *Nitrification, *Denitrification, Effluents, Municipal wastes, *Waste water treatment, Tertiary treatment, Treatment facilities.

The full scale testing of a 300 mgd water reclamation system that will produce water for industries located along the southern shore of Suisun Bay, California, is described. Treatment in the planned plant will consist of lime coagulation-sedimentation, nitrification, and denitrification. Performance data for a representative three months of operation were tabulated and indicate that the performance of the Advanced Treatment Test Facility (ATTF) is stable. The concentration of organics in the nitrified and denitrified effluents is low, as measured by BOD and organic carbon. Operation for complete nitrification also results in high organic removals. Suspended matter concentrations in the nitrified and denitrified effluents are also exceptionally low. This is attributed in part to the fact that the sludge has tended to be in a bulking condition, and effluents from bulking sludges are quite commonly very clear. Total nitrogen in the denitrified effluent averages less than 2 milligrams/liter. More than half of the effluent nitrogen is organic nitrogen, much of which will be removed by effluent filtration. Total phosphorus is below the one milligram/liter limit. Based on the three months of performance, it is concluded that the system can dependably produce the quality of effluent required. (Merritt-FIRL)
W74-10349

DISINFECTION PRACTICES IN THE SAN FRANCISCO BAY AREA,
Wallace and Tiernan, Inc., San Francisco, Calif.
G. C. White.
Journal Water Pollution Control Federation, Vol 46, No 1, p 89-101, January 1974. 7 fig, 1 tab, 11 ref.

Descriptors: *Disinfection, *Water treatment, *California, Treatment facilities, Domestic water, Activated sludge, Filtration, Oxidation, Chlorine, Recirculated water, Municipal wastes, *Waste water treatment, Mixing, Bays.
Identifiers: *San Francisco Bay area.

The disinfection of wastewater in the San Francisco Bay area, based on an investigation of 36 treatment plants over a six month period in 1972 is discussed. The data collected included: type of treatment process, characteristics of influent wastewater, chlorine dosage, chlorine consumption, chlorine residual, biochemical oxygen demand of influent and effluent, suspended solids in the effluent, contact time, contact chamber configuration, most probable number (MPN) of coliform in effluent, dye studies of contact chambers, pH, ammonia nitrogen, mixing at point of application, type of chlorine control system, monitoring if any, reliability of operation, and method of measuring chlorine residual. The data are organized in groups characterized by the basic treatment process: 11 primary, 15 activated sludge, four secondary using high rate recirculating filters, four secondary followed by oxidation ponds, one tertiary, and one consisting of oxidation ponds only. Mixing was of major importance to good disinfection performance. The optimum dosage of chlorine for disinfection of domestic wastewater is between 10 and 15 milligrams/liter. The optimum residual with adequate mixing such as in a hydraulic jump seems to be between 3-4 milligrams/liter with not less than 30 minutes contact time. (Merritt-FIRL)

W74-10350

5E. Ultimate Disposal Of Wastes

SUMMARY EVALUATION OF CANDIDATE FLUID-BED SOLIDIFICATION PROCESSES FOR USE IN THE NWCF,
Allied Chemical Corp., Idaho Falls, Idaho. Idaho Chemical Programs Operations Office.
For primary bibliographic entry see Field 5D.
W74-09829

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Division of Waste Management and Transportation (AEC), Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-09839

ICE MELTING EXPERIMENTS--A MODEL STUDY FOR BURIAL OF RADIOACTIVE WASTES,
Sandia Lab., Albuquerque, N.Mex.
For primary bibliographic entry see Field 5D.
W74-09868

SAVANNAH RIVER LABORATORY PROGRESS REPORT-LONG-RANGE WASTE MANAGEMENT.
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
Available from NTIS, Springfield, Va., as Rept. No. DPST-72-125-6; $4.00/copy, $1.45/microfiche. Report No DPST-72-125-6, September 1972. 11 p, 4 fig.

Descriptors: *Radioactive waste disposal, *Research and development, *Waste storage, Geology, Hydrology, *Safety, Evaluation, Rocks, Soils, Stratigraphy, Bedrock, Hydrogeology, On-site investigations, Sediments, Faults(Geologic), Mesozoic era.
Identifiers: Bedrock storage, Triassic formation.

The exploratory and development program for the bedrock storage of wastes is being deferred indefinitely by the AEC. Two segments of this program will be continued to conclusion by January: (1) exploration of the Triassic formation beneath the plantsite, and (2) technical reassessment of the bedrock storage concept. The Triassic exploratory program was designed to develop knowledge of this region equivalent to knowledge of the crystalline bedrock. About four wells were anticipated; the two or three wells to define the limits of the basin were not started and will be deferred; the wells that are being drilled to investigate the hydrology of a fault within the basin will be completed to the extent needed to explore the fault, and the drilling data will be accumulated, analyzed, and documented. Technical reassessment of the concept of storage of wastes in bedrock beneath the plantsite on the basis of the information that has been obtained will be made. (Houser-ORNL)
W74-09881

THERMAL DISCHARGES--PROBLEMS AND OPPORTUNITIES,
Division of Biology and Medicine (AEC), Washington, D. C.
For primary bibliographic entry see Field 5D.
W74-09888

GROUND WATER POLLUTION FROM SUBSURFACE EXCAVATIONS: PART IV. MORE ON POLLUTION FROM WELLS.
For primary bibliographic entry see Field 5B.
W74-09929

RULES PERTAINING TO STANDARDS FOR SUBSURFACE SEWAGE AND NON-WATER-CARRIED WASTE DISPOSAL.
Oregon State Dept. of Environmental Quality, Portland.
January 1974. 106 p, 12 append.

Descriptors: *Oregon, *Sewage disposal, *Sewage, *Waste disposal, *Waste treatment, *Septic tanks, Wastes, Municipal wastes, Sanitary engineering, Sewage districts, Sewage effluents, Sewage treatment, Sewage lagoons, Water pollution, Water pollution sources, Cesspools, Disposal, Domestic wastes, Farm wastes, Soil disposal fields, Regulation.
Identifiers: *Administrative regulations.

Rules prescribe the requirements for the construction, operation and maintenance of subsurface sewage disposal systems and nonwater-carried waste disposal facilities, and establish procedures for regulation of such activities. The purpose is the restoration and maintenance of the quality of the public waters and the protection of the public health and welfare. The rules provide for the issuance of permits where proposed constructions are in accordance with the rules of the Environmental Quality Commission. The rules require standards for the installation of a subsurface sewage disposal system, designed to prevent degradation of the quality of any public waters in the state, or creation of a health hazard. Requirements of size, liquid capacity and installation of septic tanks are also prescribed. Detailed minimum requirements for disposal areas and distribution techniques are listed. Nonwater-carried waste disposal facilities also require a permit and requirements for their construction are prescribed. Under the rules, licenses are required for sewage disposal services, and equipment operation must comply with listed rules. (Craig-Florida)
W74-09993

FACTORS IN REGIONAL ASSESSMENT OF WASTEWATER REUSE,
Camp, Dresser and McKee, Boston, Mass.
For primary bibliographic entry see Field 5D.
W74-10016

SANITARY LANDFILL,
Army Construction Engineering Research Lab., Champaign, Ill.
D. L. Nelson.
Available from National Technical Information Service as AD-773 714, $3.25 in paper copy, $1.45 in microfiche. Final Report January 1974. 5 fig, 5 tab, 9 ref.

Descriptors: *Reviews, *Landfills, *Sanitation, *Design criteria, Engineering structures, Hydrology, Geology, Climatology, Costs, Mathematical costs.
Identifiers: *Sanitary landfills.

A literature review details the operation and design of sanitary landfills. Operational parameters reviewed include basic methods of operation, compaction procedures and expected in-place refuse densities, cover requirements, and site improvements. The engineering design consideration were: refuse decomposition (including production and control of leachate and gas); the use of information on hydrology, geology, climatology, and waste characteristics to evaluate and classify sanitary landfill sites; possible uses for a completed landfill site; and equipment cost data. Mathematical analyses defined optimum cell shape and minimum cover conditions in terms of landfill parameters. (Prague-FIRL)
W74-10018

SAVING A DYING SEA. THE LONDON CONVENTION ON OCEAN DUMPING,
For primary bibliographic entry see Field 6E.
W74-10065

TRANSPORTATION FOR DUMPING AND DUMPING OF MATERIAL INTO OCEAN WATERS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10070

WELLBORE EFFECTS IN INJECTION WELL TESTING,
Marathon Oil Co., Denver, Colo.
For primary bibliographic entry see Field 8G.
W74-10091

SAVANNAH RIVER LABORATORY, WASTE MANAGEMENT QUARTERLY REPORT, JANUARY-MARCH 1973.
Du Pont de Nemours (E.I.) and Co., Aiken, S. C. Savannah River Lab.
For primary bibliographic entry see Field 5D.
W74-10116

RADIOACTIVE SOLID WASTE DISPOSAL INTO THE OCEANS: IMPLICATIONS AND PERSPECTIVES,
Comitato Nazionale per l'Energia Nucleare, Rome (Italy).
C. Polvani.
Available from NTIS, Springfield, Va., as Rept. No. RT/PROT-70-34; $4.00/copy, $1.45/microfiche. Presented at Symposium on the International Regime of the Sea-Bed; Rome, Italy, June 30, 1969. Report No. RT/PROT-(70)-34, 1969. 20 p, 25 ref.

Descriptors: Radioactive waste disposal, Solids, Waste treatment, Nuclear wastes, Oceans, Continental shelf, Basins, Concretes, Water pollution, Regulation, Food chains, Public health, Research and development.
Identifiers: Containment, Deep basins.

The sea bottom has been considered as a possible site for the disposal of solid materials having low, or sometimes intermediate, activity. Sea dumping, however, is a final act and should be used only for materials for which no future is foreseeable. Furthermore, if the sea dumping has been carried on under conditions or to an extent that later appear to have been ill-advised or dangerous, there is no practical way of correcting the situation. These considerations obviously lead to limitations of the possibility of dumping solid wastes into the sea. First of all, not all solid wastes can be taken into consideration for such a solution. There has never been any suggestion of using the sea for the really high level wastes, such as those arising directly from the chemical processing of spent nuclear fuel. Additional limitations are specifications of containment material and the area of the sea in which to dump. The continental shelf and deep basins are discussed as possible dump sites. (Houser-ORNL)
W74-10117

OVERVIEW OF HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT STUDIES.
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
For primary bibliographic entry see Field 5D.
W74-10124

BRICKS ARE BEING FORMED FROM MANURE AND GLASS.
Hoard's Dairyman, Vol 119, No 1, p 35, January 10, 1974.

Descriptors: *Farm wastes, *Cattle, *Recycling, *Waste disposal, Dairy industry, *Construction materials.
Identifiers: *Glass, *Bricks.

Dr. John D. Mackenzie, Los Angeles engineering professor, has perhaps found an answer to the problem of animal waste disposal. He has perfected building products, such as bricks, tiles, wall core materials, and garden stones, from a mixture of dried cow manure and broken glass bottles blended together in a pressure cooker. The building products are stronger and lighter than any now on the market. They are fireproof, odorless, noise and heat insulators, and can be drilled, sawed, painted and glued easily. This inexpensive process answers two problems: (1) environmental concerns on the farm, and (2) badly needed construction materials. It also utilizes the untold amounts of disposable glass containers. The University of California has applied for patents covering the main process. (Cameron-East Central)
W74-10129

NO ODOR AND NO POLLUTION,
Soil Conservation Service, Hondo, Tex.
For primary bibliographic entry see Field 5D.
W74-10132

CONCENTRATION OF PROTEINACEOUS SOLIDS FROM AERATED SWINE MANURE,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10140

A ROTATING FLIGHTED CYLINDER TO SEPARATE MANURE SOLIDS FROM WATER,
Dept. of Agricultural Engineering. Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 5D.
W74-10145

SYMPOSIUM: PROCESSING AGRICULTURAL AND MUNICIPAL WASTES.
For primary bibliographic entry see Field 5D.
W74-10149

THE CHALLENGE OF WASTE UTILIZATION,
For primary bibliographic entry see Field 5D.
W74-10150

PROCESSING ANIMAL WASTES FOR FEED AND INDUSTRIAL PRODUCTS,
For primary bibliographic entry see Field 5D.
W74-10152

FUEL FROM AGRICULTURAL WASTES,
For primary bibliographic entry see Field 5D.
W74-10157

INTERNATIONAL SYMPOSIUM ON WASTE-WATER TREATMENT IN COLD CLIMATES.
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5D.
W74-10160

AN EVALUATION OF WASTE DISPOSAL PRACTICES IN ALASKA VILLAGES,
Alaska State Dept. of Environmental Conservation, Fairbanks.
For primary bibliographic entry see Field 5D.
W74-10161

PROBLEMS OF THE CANADIAN NORTH,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
For primary bibliographic entry see Field 5D.
W74-10165

RENOVATION OF SECONDARY EFFLUENT FOR REUSE AS A WATER RESOURCE,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-10197

DEMONSTRATION OF THREE RECIRCULATING SWINE WASTE MANAGEMENT SYSTEMS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10198

SOIL MOTTLING AND DRAINAGE IN A MOLLIC HAPLUDALF AS RELATED TO SUITABILITY FOR SEPTIC TANK CONSTRUCTION,
Wisconsin Univ., Madison. Coll. of Agricultural and Life Sciences.
For primary bibliographic entry see Field 5B.
W74-10212

BUREAU OF MINES ENVIRONMENTAL ACTION PROGRAMS FOR NORTHEASTERN PENNSYLVANIA--REFUSE BANK REMOVAL; SUBSIDENCE MONITORING,
MITRE Corp., McLean, Va.
For primary bibliographic entry see Field 5A.
W74-10270

DEPOLLUTION TECHNIQUES AND MANAGEMENT IN AN OIL REFINERY,
Indian Inst. of Petroleum, Dehra Dun.
For primary bibliographic entry see Field 5D.
W74-10280

WATER DESALTING,
J. S. Johnson, K. A. Kraus, and A. E. Martsinkovskii.
Soviet Patent 381195. Issued March, 1974. Soviet Inventions Illustrated, Vol 5, No 8, p 1, March, 1974.

Descriptors: *Filtration, *Patents, *Desalination, *Membrane processes, Membranes, Porous media, Ion exchange, Metals, Salts, Organic matter, Solutions, Solubility, Suspensions, Pressure.
Identifiers: Inorganic materials, Multi-valent metal salts, U.S.S.R.

High pressure filtration through a porous membrane accomplishes water desalting after the addition of surfactants. These include neutral organic polymers, polyelectrolytes, organic and inorganic ion-exchangers, and multi-valent metal salts, which may be added as solutions, suspensions, or emulsions. The method proposed may be used for sea, industrial, and radioactive water. Water is passed at pressure 1000 psi through a porous membrane such as a metal filter, charcoal, or cellophane. The additives form a film on the membrane which repulses soluble materials. (Prague-FIRL)
W74-10284

CONFERENCE PAPERS, NATIONAL DAIRY HOUSING CONFERENCE.
For primary bibliographic entry see Field 5D.
W74-10297

LAGOON DISPOSAL OF DAIRY WASTES IN FLORIDA,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10302

IRRIGATION DISPOSAL OF MILKING CENTER WASTES,
Missouri Univ., Columbia. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10304

MANAGING BARNYARD RUNOFF FOR DAIRY CATTLE,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10306

AGITATING, PUMPING, AND INJECTING LIQUID MANURE,
Starline, Inc., Harvard, Ill.
For primary bibliographic entry see Field 5D.
W74-10307

FLUSHING SYSTEMS FOR FREE-STALL DAIRY BARNS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10309

5F. Water Treatment and Quality Alteration

HIGH RATE FILTRATION MEDIA CONCEPTS,
Taulman Co., Atlanta, Ga. Turbitrol High Rate Filter Div.
E. F. Morey.
Public Works, Vol 105, No 5, p 80-83, May 1974. 3 fig,

Descriptors: *Filtration, *Water treatment, *Filters, *Sand, Silica, Design criteria, Pilot plants, Experimentation, Costs, Installation.
Identifiers: Filter bed, Dual filters, Uniform dual filters, Mixed media filters, One inch cap filters.

High rate filtration has become a viable alternative to conventional silica sand media filters. Five types of filter media are: silica sand only, where grain size is distributed from fine to coarse from top to bottom; the so-called 'ideal filter' with grain size gradually decreasing throughout bed depth; the conventional dual-media filter incoporating an anthracite coal layer on top of silica sand; the mixed or tri-media concept, utilizing a combination of anthracite, silica sand and garnet or ilmenite; and the uniform dual-media filter comprised of highly uniform anthracite and silica layers. The last three are approaches to the so-called ideal filter bed design. Three plants throughout the country were compared using dual, uniform dual, mixed media, and one inch caps (a slightly modified conventional sand filter. Based upon their data, uniform dual-media and mixed media filters exhibited better performance than conventional dual media filters. The efficiency increase from significantly longer filter runs will offset costs of installation. (Prague-FIRL)
W74-10014

HIGH-RATE FILTRATION,
CH2M/Hill, Corvallis, Oreg.
For primary bibliographic entry see Field 5D.
W74-10015

FACTORS IN REGIONAL ASSESSMENT OF WASTEWATER REUSE,
Camp, Dresser and McKee, Boston, Mass.
For primary bibliographic entry see Field 5D.
W74-10016

SELECTING MIXERS FOR TREATMENT OPERATIONS,
Philadelphia Mixers Corp., Pa.

For primary bibliographic entry see Field 5D.
W74-10017

SLUDGE BLANKET FOR WATER TREATMENT.
Standard Telephones and Cables Pty. Ltd., Alexandria (Australia).
For primary bibliographic entry see Field 5D.
W74-10020

DESIGN AND PERFORMANCE OF CHLORINE CONTACT TANKS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 5D.
W74-10035

POTABLE WATER--QUALITY GOALS,
For primary bibliographic entry see Field 5G.
W74-10059

AN OVERVIEW OF THE PROBLEMS OF DISINFECTION,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5D.
W74-10181

CHLORINE DISINFECTION OF WASTEWATER,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
For primary bibliographic entry see Field 5D.
W74-10182

LIME DISINFECTION OF SEWAGE BACTERIA AT LOW TEMPERATURE,
Colorado State Univ., Fort Collins. Dept. of Microbiology.
For primary bibliographic entry see Field 5D.
W74-10183

OZONE DISINFECTION OF WASTEWATERS AT LOW TEMPERATURES,
Cincinnati Univ., Ohio. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W74-10184

ALASKA VILLAGE DEMONSTRATION PROJECTS: FIRST GENERATION OF INTEGRATED UTILITIES FOR REMOTE COMMUNITIES,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
For primary bibliographic entry see Field 5D.
W74-10186

A STUDY OF BDELLOVIBRIO BACTERIOVORUS AS A BIOLOGIC FACTOR OF SELF PURIFICATION OF WATER BODIES, (IN RUSSIAN),
For primary bibliographic entry see Field 5C.
W74-10204

A STUDY OF INCINERATOR RESIDUE ANALYSIS OF WATER SOLUBLE COMPONENTS,
Drexel Univ., Philadelphia, Pa. Environmental Engineering Program.
For primary bibliographic entry see Field 5B.
W74-10269

PROGRESS IN THE RURAL WATER PROGRAMS OF LATIN AMERICA (LOS PROGRAMAS DE ABASTECIMIENTO RURAL DE AQUA DE AMERICA LATINA),
For primary bibliographic entry see Field 6E.
W74-10279

DISINFECTION PRACTICES IN THE SAN FRANCISCO BAY AREA,
Wallace and Tiernan, Inc., San Francisco, Calif.
For primary bibliographic entry see Field 5D.
W74-10350

5G. Water Quality Control

INSTITUTIONAL FACTORS IN THE CREATION OF LOCAL SANITARY DISTRICTS IN WISCONSIN,
Wisconsin Univ., Madison. Land Tenure Center.
For primary bibliographic entry see Field 5D.
W74-09811

A BIBLIOGRAPHY OF THE ZOOLOGY OF TENNESSEE AND THE TENNESSEE VALLEY REGION,
Office of Information Services (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 2I.
W74-09826

THE REGULATION OF THE ENVIRONMENTAL EFFECTS OF NUCLEAR POWER PLANTS,
Consolidated Edison Co. of New York, Inc., New York.
For primary bibliographic entry see Field 5C.
W74-09866

MANAGEMENT OF SOLID RADIOACTIVE WASTES,
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-09874

STATISTICAL TESTS OF LEOPOLD'S SYSTEM FOR QUANTIFYING AESTHETIC FACTORS AMONG RIVERS,
Calgary Univ. (Alberta). Dept. of Geography.
For primary bibliographic entry see Field 6G.
W74-09913

SOME ASPECTS OF AQUATIC INSECT POPULATIONS OF POOLS AND RIFFLES IN GRAVEL BED STREAMS IN WESTERN UNITED STATES,
Geological Survey, Doraville, Ga.
For primary bibliographic entry see Field 2E.
W74-09919

ECOLOGICAL MANAGEMENT OF THERMAL DISCHARGES,
California Univ., Berkeley. Dept. of Sanitary Engineering and Public Health.
For primary bibliographic entry see Field 5D.
W74-09923

DRAINAGE AND EROSION CONTROL FACILITIES, FIELD PERFORMANCE INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8A.
W74-09948

ENVIRONMENTAL PROTECTION AND ADMINISTRATIVE CHANGE IN STATE WATER MANAGEMENT IN THE PACIFIC COAST STATES,
California Univ., Davis. Dept. of Political Science; and California Univ., Davis. Div. of Environmental Studies.
For primary bibliographic entry see Field 6E.
W74-09951

LONG ISLAND WATER,
For primary bibliographic entry see Field 2F.
W74-09961

EXECUTIVE ORDER NO. 11735: ASSIGNMENT OF FUNCTIONS UNDER SECTION 311 OF THE FEDERAL WATER POLLUTION CONTROL ACT.
For primary bibliographic entry see Field 6E.
W74-09975

COASTAL WETLANDS PROTECTION LAW.
For primary bibliographic entry see Field 6E.
W74-09981

POWER PLANTS AND COTTONTAILS,
Cornell Univ., Ithaca, N.Y.
B. Wallace.
Saturday Review of the Sciences, Vol 1, p 34-35, May, 1973. 1 photo.

Descriptors: *Electric power industry, *Cost-benefit analysis, *Decision making, *Project planning, Economics, Indirect costs, Thermal pollution, Waste water Water pollution sources, Radioactivity, Analytical techniques, Social aspects, Aesthetics, Direct benefits, Direct costs, Water pollution effects, Environmental sanitation, Water conservation, Radioactive waste, Government finance, Electric power demand, Nuclear powerplants.
Identifiers: *National Environmental Policy Act(NEPA), *Environmental impact statement(EIS).

The impact of a three-thousand megawatt nuclear power station on the environment is discussed. The benefits derived from the construction of the plant included more tax money, more jobs and more power. However, there were also costs involved. The plant would encompass one-hundred and forty-five acres. There would be a seven per cent increase in radiation exposure, and seven hundred pounds of salt would be dumped into Lake Ontario daily. Concern is expressed that perhaps the costs are not adequately listed. The effects of three-thousand megawatts, one-tenth the energy consumed in 1940 America, could hardly be confined to under one-hundred and fifty acres. To be of use in arriving at rational decisions, an environmental impact study, even though prepared for a single power plant, cannot pretend its subject exists in a vacuum. By being constrained to an analysis of individual stations, one by one, none of the study groups will notice when the heat, salt, radioactive wastes, and the cascading ramifications of energy production have merged. (Sperling-Florida)
W74-09982

INVERSE CONDEMNATION--STREAM POLLUTION AS TAKING OF PROPERTY FOR PUBLIC USE.
Tennessee Law Review Vol 40, p 514-520, Spring 1973. 36 ref.

Descriptors: *Streams, *Legislation, *Sewage, *Value, Water pollution, Public use, Eminent domain, Pollution, Legal aspects, Riparian rights, Waste disposal, Waste water(Pollution), Pollutants, Water pollution effects, Water quality, Public rights, Pollution abatement, Water pollution control.
Identifiers: *Inverse condemnation.

Inverse condemnation describes a cause of action designed to recover the value of property taken by a government defendant even though no exercise of its power of eminent domain has been attempted. Dumping municipal sewage into a private stream results in a serious impairment of riparian rights and actions may be brought on theories of nuisance, negligence or statutory remedies. However, it is unclear whether the resulting injury to

the riparian owner constitutes a taking, which can result in an inverse condemnation action. The majority of jurisdictions follow the principle that the pollution of a stream by sewage or for any other public purpose is a taking of property in the constitutional sense, and it cannot be effected without compensation. Such actions present the problem of determining at what point in time the taking occurred, so as to calculate damages. With the continuing erosion of governmental immunity such actions may be outmoded, but the need exists for such an action, especially by those landowners who can show actual damages. (Sutton-Florida)
W74-09983

POLLUTION CONTROL: PRELIMINARY MANDATORY INJUNCTION TO PREVENT, CORRECT OR REDUCE EFFECTS OF POLLUTING PRACTICES,
For primary bibliographic entry see Field 6E.
W74-09986

JELLYFISH CONTROL.
Committee on Merchant Marine and Fisheries (U.S. House).
For primary bibliographic entry see Field 6E.
W74-09989

APPLICATION OF FEDERAL WATER POLLUTION CONTROL ACT REQUIRING NOTICE TO FEDERAL AGENCY OF PROHIBITED DISCHARGE FROM A VESSEL OR FACILITY,
For primary bibliographic entry see Field 6E.
W74-09991

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT BY PROVIDING FOR THE REGULATION OF DUMPING IN UNITED STATES WATERS.
For primary bibliographic entry see Field 6E.
W74-09992

POLICY FOR LOCATION OF OFFSHORE PORTS AND OIL REFINERIES IN COASTAL AREAS,
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Industrial Tourist and Community Resources.
R. E. Leak, W. S. Gaither, L. S. St Amant, and W. D. Welch.
Report of the Governor's Conference on Marine Resources, p 35-42, December 17-18, 1973.

Descriptors: *Offshore platforms, *Oil pollution, *Coastal structures, *Water pollution sources, *Harbors, Port authorities, Oil, Oil industry, Oil spills, Environmental effects, Oily water, Coasts, Ships, Water pollution, Oil wastes, Social aspects, Pipelines, Sites.

Three views on a policy for location of offshore ports and oil refineries in coastal areas are presented: the port designer's viewpoint, the industrial developer's viewpoint, and the environmentalist's viewpoint. The industrial developer suggested the establishment of environmental and socio-economic parameters in the siting of offshore ports which are related to onshore capacity to support refinery operations. The ability of an area to support refinery operations must be well developed before a decision to construct an offshore port is made. He concluded that refineries should be located away from congested areas, with the southeast coastal areas as prime locations for offshore port development. The port designer reached similar conclusions, although he felt offshore ports should be constucted close to existing refineries. The environmentalist concluded that deepwater and shore facilities can be constructed with little damage to the environment. He feels refineries can be placed anywhere and there is great flexibility in use of pipelines. (Craig-Florida)
W74-09995

THE 1972 CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AT SEA,
R. N. Duncan.
Journal of Maritime Law and Commerce, Vol 5, No 2, p 299-315, January 1974. 24 ref, append.

Descriptors: *Permits, *Treaties, *International law, *Oceans, *Waste disposal, *Water pollution sources, Regulation, United Nations, Water law, Legal aspects, Environmental sanitation, Water conservation, Oily wastes, Radioactive wastes, Industrial wastes, Pesticide residues, Inorganic compounds, Heavy metals, Navigation, Fishing, Standards, Water pollution effects, Toxicity.
Identifiers: Navigation obstructions, Hazardous substances(Pollution), Mercury pollution.

In 1972 eighty countries signed the Convention on the Prevention of Marine Pollution. The convention is the result of a United Nations Conference and it imposed a three-tier system toward the dumping of waste at sea. The dumping of certain wastes will be prohibited and the dumping of other wastes will require a special permit. A general permit will be required to dump all other substances. Wastes on the prohibited list include mercury, plastics, oils, radioactive wastes, and materials produced for biological or chemical warfare. Wastes which require a prior special permit include arsenic, zinc, lead, copper, cyanides, fluorides, and pesticides. Prior special permits are also required for the dumping of containers, scrap metal, and other bulky wastes which could pose a hazard to fishing and navigation. Before a prior general permit can be issued certain criteria must be satisfied. These relate to quantity, composition, form, toxicity, persistence, accumulative effects, and the possibility of the tainting of fish, as well as the characteristics of the dumping site. (Sperling-Florida)
W74-09998

THE UNCERTAIN SEARCH FOR ENVIRONMENTAL POLICY: THE COSTS AND BENEFITS OF CONTROLLING POLLUTION ALONG THE DELAWARE RIVER,
Pennsylvania Univ., Pa.
B. A. Ackerman, S. R. Ackerman, and D. W. Henderson.
University of Pennsylvania Law Review, Vol 121, No 6, p 1225-1308, June 1973. 193 ref, 2 append.

Descriptors: *Cost-benefit analysis, *Federal Water Pollution Control Act, Delaware River, *Delaware River Basin Commission, *Comprehensive planning, Water resources development, Valleys, River basin commissions, Estuaries, Environmental effects, Sewage, Municipal wastes, Water pollution, Water pollution effects, Project planning.

The scientific and economic foundations of water pollution control policy as it is evolving in the United States are examined. In 1967 the Delaware River Basin Commission (DRBC) met to adopt a massive program to control the wasteload imposed on the Delaware as it flows through Philadelphia, Pennsylvania. The DRBC had the benefit of a study in which the Delaware Estuary Comprehensive Study (DECS) attempted to quantify the costs and benefits of embarking upon a variety of clean-up programs under consideration by the DRBC. The cost-benefit analysis tendered to the DRBC by the DECS is discussed. The environmental goals selected by the DRBC are imposed upon the nation by the Federal Water Pollution Control Act Amendments of 1972. By analyzing the Delaware Valley, the pollution control objectives of the United States are evaluated. The extent to which cost-benefit analysis enhances the rationality of decisions made by functioning agencies is analyzed. Through analysis of the DECS Report, the relationship between the economist's cost-benefit methodology and alternative ways of understanding the environmental problem is considered. (Craig-Florida)
W74-09999

THE CRIME OF 'POLLUTION': THE ROLE OF FEDERAL WATER POLLUTION CRIMINAL SANCTIONS,
Environmental Protection Agency, Washington, D.C.
M. K. Glenn.
The American Criminal Law Review, Vol 11, No 4, p 835-882, Summer 1973. 208 ref.

Descriptors: *Law enforcement, *Water quality control, *Federal Water Pollution Control Act, Legislation, Pollution abatement, Permits, Water quality standards, Regulation, Water Quality Act, Water pollution control, Legal aspects, Federal government, Administrative agencies, Federal jurisdiction, State jurisdiction, Effluents, Waste disposal, Wastes, Penalties(Legal), Rivers and Harbors Act.

The provisions, Application, and effects of the Refuse Act of 1899 and the 1972 Amendments to the Federal Water Pollution Control Act include criminal sanctions as a means of abating pollution. The Refuse Act prohibits the discharge of any refuse matter into navigable United States waters. Rufuse matter has been interpreted to include pollutants. The Act has been a basis for both civil injunctive relief and criminal prosecution. In addition, the Act authorized an effluent discharge permit system which precluded the necessity for many criminal prosecutions. The 1972 Amendments prohibit the discharge of any pollutant into navigable waters by any point source unless the discharge is in accordance with the conditions and limitations of a required permit. Administrative compliance orders, civil penalties, injunctive relief, and criminal sanctions are available against negligent or willful violators. Enforcement authority is to be exercised concurrently by federal and state governments, with primary responsibility resting with the states. While the Refuse Act provided minimal punishment, the possible $25,000 per day fines for violation of the 1972 Amendments can be substantial deterrents. (Hunter-Florida)
W74-10000

REGULATION OF AIR AND WATER QUALITY IN KANSAS: A CRITICAL LOOK AT LEGISLATIVE AMBIGUITY AND ADMINISTRATIVE DISCRETION,
Kansas Univ., Lawrence. School of Law.
G. C. Coggins.

Descriptors: *Water pollution control, *Kansas, *Regulation, *Federal government, *Legislation, Public health, Water pollution sources, Water quality control, Institutional constraints, State governments, Adoption of practices, Farm wastes, Oil wastes, Sewage effluents, Administrative agencies, Decision-making, Industrial wastes, Political aspects, Treatment facilities, Construction, Water conservation.
Identifiers: *Administrative regulations, *Hazardous substances(Pollution).

The inability of state governments to meet the problem of basic water quality has resulted in the expansion of federal control over the regulation of water pollution. This pattern is illustrated in Kansas. The legislature delegated regulatory power to the unguided and uncontrolled discretion of the board of health. They in turn delegated it to the Division of Environmental Health. After several years of inactivity they were forced by the federal Environmental Protection Agency into taking a few effective steps. When not coerced, state regulators have been less than eager to eliminate pollution. The discretionary power of state agencies is lessening as federal requirements tighten. Total federal preemption is likely if the state does not take positive action with respect to effective regulation and control over administrators. However, many new statutes and regulations are pending. Kansas rivers are already polluted. The largest source of this pollution is agricultural run-off. Other sources such as sewage systems, industrial

wastes, pesticides, boats, siltation, and oil spills compound the problem. Monitoring procedures have been notoriously inadequate. However, extensive recent construction of treatment facilities is a hopeful sign that health hazards have been recognized. (Sperling-Florida)
W74-10001

A BILL TO AMEND THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972, IN ORDER TO IMPLEMENT THE PROVISIONS OF THE CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AND OTHER MATTER, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W74-10004

JOINT RESOLUTION TO SET ASIDE REGULATIONS OF THE ENVIRONMENTAL PROTECTION AGENCY UNDER SECTION 206 OF THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.
For primary bibliographic entry see Field 6E.
W74-10009

OIL POLLUTION REGULATIONS, OIL POLLUTION PROHIBITED ZONES.
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10010

PHOSPHATE MANUFACTURING POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 173, p 24470-24474, Sept. 7, 1973.

Descriptors: *Regulation, *Federal Water Pollution Control Act, *Standards, *Water pollution sources, *Phosphorous, Inorganic compounds, Administration, Adoption of practices, Water quality control, Administrative agencies, Technology, Environmental sanitation, Legislation, Water conservation, Federal government, Decision making, Specifications, Effluents, Treatment facilities, Industrial waste, Wastewater disposal, Analytical techniques.
Identifiers: *Administrative regulations, *Hazardous substances(Pollution).

Effluent limitation guidelines for existing sources and standards of performance and pretreatment standards for new sources in the phosphorous industry have been issued by the Environmental Protection Agency. The Federal Water Pollution Control Act requires that by July 1977, effluent limitations for point sources other than publicly owned treatment works will be determined with regard to the best practicable control technology as defined by the Administrator of EPA. The rules show the general methodology for the development of effluent limitations and guidelines. This includes an analysis of the source, flow and volume of water used in the industrial process. The sources of waste and waste water in the operation were also considered. No significant economic impact should result from imposing the requirement of eliminating discharges of process waste water pollutants into navigable waters. The small price increases projected can probably be fully passed on to industries using the phosphates, since there are few substitutable products. (Sperling-Florida)
W74-10012

NAVIGABLE WATERS OF STATE OF WEST VIRGINIA--WATER QUALITY STANDARDS--PROPOSED RULES.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 181, p 26209-26211, September 19, 1973.

Descriptors: *Federal Water Pollution Control Act, *West Virginia, *Regulation, *Water quality control, Administrative agencies, Coordination, Thermal pollution, Administration, Federal government, Legislation, Standards, Navigable waters, Interstate rivers, Environmental sanitation, Adoption of practices, Water conservation, Data collection, Waste water disposal, Legal aspects, Water policy, Management.
Identifiers: Administrative regulations, Federal Water Pollution Control Act Amendments of 1972.

Notice is given of proposed regulations setting forth standards of water quality to be applicable to the navigable waters of West Virginia, issued pursuant to the Federal Water Pollution Control Act. Under the Act the administrator of the Environmental Protection Agency is required to review water quality standards adopted by states for interstate and intrastate waters. If changes are required he must notify the states. If the state does not adopt the revisions or if their revisions do not meet the requirements of the Act, the Administrator is to publish proposed standards in accordance with such requirements. These regulations are being issued because West Virginia did not respond to notice of the required revisions. These regulations will supersede all existing standards where there are inconsistencies. The regulations deal with effluent levels, uses of navigable waters, water temperature and other water characteristics. (Sperling-Florida)
W74-10013

CRUDE OIL SWEEP DREDGE,
E. Dilney.
Canadian Patent 943,871. Issued March 19, 1974. Patents/Brevets, Vol 102, No 12, p 1010, March 19, 1974.

Descriptors: Equipment, *Oil, *Sludge, *Patents, Water purification, Dredging, Canada, Water pollution control, Separation techniques.

An apparatus for removal of oil and sludge from the surface of water is described. The apparatus can be mounted on a vessel and has an endless bucket conveyor supported by an arm structure which extends into the water at one end and to a discharge area in the vessel at the other end. A drive moves the conveyor so it picks up oil and sludge and carries it to the discharge area. A means of supply heat is adjacent to the discharge area and aids the discharge of oil and sludge from the buckets. (Merritt-FIRL)
W74-10030

STRATEGIES IN WATER QUALITY CONTROL,
North Carolina Univ., Chapel Hill. Dept. of Economics.
W. E. McFarland.
Natural Resources Journal, Vol 12, p 318-329, July, 1972. 11 ref.

Descriptors: *Pollution abatement, *Pollution control, *Economic efficiency, *Regional economics, *Pollution taxes(Charges), *Water quality control, Economic feasibility, Resource allocation, Regional development, Administrative costs, Evaluation, Social values, Water demand, Water quality, Water control, Administration, Management, Costs, Institutions, Water allocation(Policy), Regulation, Water law.

Water quality control programs commonly have a phase to determine the desired water quality and another phase to implement the desired quality. The implementation phase is discussed and three strategies, a system of waste discharge quotas, effluent charges, and waste discharge permits market, are compared. All three strategies have common features; that is, sources of pollution must be identified, a set of water quality indicators must be found, water quality regions must be identified and designated, a monitoring system must be established, and maximum total discharges must be calculated. Provisions must be made to allow for changes in the objective water quality standard, the allocation of permits among users to achieve cost-minimization, and the discharge rate determined to achieve a specific water quality. The criteria used to evaluate the three strategies are cost of abatement, cost of administration, equity, ease of enforcement and the revenues generated. Discharge quotas faired poorly in comparison with the other two methods because as costs of abatement decrease the cost of administration increases and operation tends to be inequitable and difficult to enforce. Effluent charges are administratively efficient, abatement costs are individually determined, operation is equitable and enforcement simple. (Barnes-Florida)
W74-10058

POTABLE WATER--QUALITY GOALS,
E. L. Bean.
Journal of the American Water Works Association, Vol 66, No 4, p 221-230, April 1974. 4 photo, 1 fig, 54 ref.

Descriptors: *Water quality standards, *United States, *Public health, *Potable water, *Water quality control, Water quality, Water pollution, Standards, Solid wastes, Epidemic, Bacteria, Chemical analysis, Chemicals, Water analysis, Chemical wastes, Water pollution standards, Pollutants, Water properties, Water pollution control.

The Environmental Protection Agency (EPA) has proposed new standards for water quality. These new standards followed a realization that stricter standards would be needed to define potable water and to provide guidelines for producers of drinking water and commercial users of water. The EPA standards vary from the current United States Public Health Service standards and from the recommendations of the American Water Works Association. Generally, the EPA guidelines define high quality potable water as that which is not only safe for consumption but is clear, palatable, non-staining, non-corrosive and not too hard, or in short, water which is pleasing to the consumer. These standards represent goals that have not yet been achieved but which provide meaningful objectives. The proposed drinking water standards establish two new categories of allowable limits. One category relates to health and the other to aesthetics. The standards cover a wide range of chemicals, turbidity, odor, organisms, and tests designed to determine quantitative presence of these factors. (Barnes-Florida)
W74-10059

WATER POLLUTION PREVENTION AND CONTROL--LIST OF TOXIC POLLUTANTS,
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 129, p 18044-18045, July 6, 1973.

Descriptors: *Regulation, *Federal Water Pollution Control Act, *Water quality standards, *Water pollution effects, *Toxicity, Public health, Toxins, Water pollution, Adoption of practices, Federal government, Environmental sanitation, Chemicals, Administrative agencies, Water quality control, Standards, Waste water discharge, Effluents, Food chain, Impaired water quality, Consumptive use, Environmental effects.
Identifiers: *Administrative regulations, *Hazardous substances(Pollution).

The Administrator of the Environmental Protection Agency is proposing a list of toxic pollutants in accordance with the Federal Water Pollution Control Act. Effluent standards will be established for these pollutants or their discharge could be prohibited. Nine pollutants are listed including, aldrin, benzidine, DDD, endrin, PCB's, toxaphene, cadmium, cyanide, and mercury. Evaluation of other water pollutants is continuing and the list

will be revised. The pollutants listed in the statute are toxic in very low concentrations. A toxic pollutant is defined as a disease causing agent which, after exposure either directly or indirectly, as through the food chain, will cause deformation or disease in organisms or their offspring. Factors to be taken into account in listing a substance include toxicity, persistence, degradability, importance of affected organisms, and the nature and extent of those effects. Focus is on those pollutants which pose the most serious hazards to man and other organisms inhabiting or consuming the water. (Sperling-Florida)
W74-10060

OUTER CONTINENTAL SHELF OFF FLORIDA--POSSIBLE OIL AND GAS LEASING.
Department of the Interior, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10061

PROTECTION OF NATIONS WETLANDS--POLICY STATEMENT.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38 No 84, p 10834-1083, May 2, 1973.

Descriptors: *Coastal marshes, *Freshwater marshes, *Conservation, *Regulation, *Tidal marshes, Aquatic habitat, Wildlife conservation, Water quality control, Water pollution effects, Environmental sanitation, Ecology, Aesthetics, Biological communities, Food chain, Administrative agencies, Waste water treatment, Municipal wastes, Waste water(Pollution), Fishing, Hunting, Recreation.
Identifiers: *Administrative regulations, *National Environmental Policy Act(NEPA), *Hazardous substances(Pollution).

It is the policy of the Environmental Protection Agency to protect wetland ecosystems from destruction through waste water dischargehrough the construction of waste water treatment facilities or through other physical, chemical, or biological means. The wetland ecosystem is unique, and is sensitive to these destructive forces. They serve as a habitat for many species of fish and wildlife. They aid in the natural purification of water, and maintain and recharge the ground water resource. They are unique recreational areas high in aesthetic value. The wetlands support fishing as well as hunting. In tidal wetland areas nutrients and sediments are redistributed throughout the tidal marsh. Protection of wetland areas requires the proper placement and management of any construction activity. Alteration in quantity or quality of the natural flow of water, which nourishes the ecosystem, should be minimized. Federal funds may not be used for the construction of municipal waste water treatment facilities which interfere with the wetland ecosystem. (Sperling-Florida)
W74-10062

LIABILITY LIMITS FOR SMALL ONSHORE OIL STORAGE FACILITIES--PROPOSED RULES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10063

THE PLANNING OF A CORPS OF ENGINEERS RESERVOIR PROJECT: LAW, ECONOMICS AND POLITICS,
Illinois Univ., Urbana.
For primary bibliographic entry see Field 6B.
W74-10064

ACQUISITION OF INFORMATION FROM OWNERS AND OPERATORS OF POINT SOURCES SUBJECT TO NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
Environmental Protection Agency, Washington, D.C.
Federal Register Vol. 38, No 75, p 9740-9742, April 19, 1973.

Descriptors: *Administrative agencies, *Adoption of practices, *Water quality standards, *Water pollution sources, *Waste water treatment, Permits, State governments, Federal government, Legislation, Regulation, Standards, Specifications, Waste water disposal, Discharge measurement, Water treatment, Industrial waste, Water pollution control, Waste treatment, Sewage effluents, Project planning, Municipal waste.
Identifiers: *Administrative regulations, *Hazardous substances(Pollution), FWPCA Amendments of 1972.

The proposed forms, guidelines, and instructions describe, pursuant to the Federal Water Pollution Control Act Amendments of 1972, procedures for the acquisition of information from owners and operators of point sources. The Administrator of the Environmental Protection Agency may issue permits for the discharge of any pollutant. The granting of the permit is conditioned upon the discharge meeting effluent limitations, water quality standards, new source performance standards, and toxic and pre-treatment effluent standards. Also monitoring, entry provisions, and guidelines establishing ocean discharge criteria must be met. States that want to administer their own permit program may submit a full and complete description of such a program to the Administrator for approval. The state, prior to approval, must have an effective continuing planning process. All owners or operators of point sources are required to apply for a permit. Special forms are required for certain municipal wastewater treatment facilities if their total discharge, population served, or quantity of industrial wastes received exceed prescribed limits. (Sperling-Florida)
W74-10069

TRANSPORTATION FOR DUMPING AND DUMPING OF MATERIAL INTO OCEAN WATERS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 65, p 8726-8730, April 5, 1973.

Descriptors: *Regulation, *Administration, *Ocean, *Waste disposal, *Adoption of practices, Decision-making, Environmental sanitation, Water conservation, Aquatic habitat, Radio-active waste disposal, Administrative agencies, Disposal, Permits, Waste dumps, Water pollution sources, Standards, Water pollution control, Water pollution effects, Legal aspects, Public health, Safety, Aesthetics, Chemical wastes.
Identifiers: *Administrative regulations, *Coastal waters, *Contiguous zone, *Hazardous substances(Pollution).

Interim regulations are issued by the Environmental Protection Agency to describe procedures for application for, and issuance and denial of, permits for ocean dumping. All dumping in the ocean or contiguous zone of the United States is prohibited without a permit. These interim regulations are effective immediately. The Administrator of the Environmental Protection Agency will establish criteria to be used in the evaluation of permit applications. These regulations also prescribe procedures for the transportation for ocean dumping of any radiological, chemical or biological warfare agents. These regulations do not apply to the dumping of fish wastes unless the dumping is in a harbor or in enclosed coastal waters. The dumping of fish wastes in any other location may be prohibited if it is found that such dumping could endanger health, the environment or ecological systems. Public notice of every complete permit application will be given to inform the public of the proposed dumping. Any person may request a public hearing to consider the issuance of any permit. (Sperling-Florida)
W74-10070

STATE CONTINUING PLANNING PROCESS--NOTICE OF INTERIM REGULATIONS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 58, p 8034-8039, March 27, 1973.

Descriptors: *Adoption of practices, *Regulation, *Project planning, *Administrative agencies, *Water quality control, *Federal Water Pollution Control Act, State governments, Federal government, Administration, Data collection, On-site data collections, Standards, Monitoring, Planning, Water pollution effects, Water pollution sources, Water conservation, Impaired water quality, Permits, Land management, Water management(Applied), Government finance, Decision making, Effluents, Municipal wastes, Water pollution treatment.
Identifiers: *Administrative regulations, *Hazardous substances(Pollution).

The Federal Water Pollution Control Act requires each state to submit a continuing planning process and these proposed regulations describe the necessary elements of that process and these proposed regulations describe the necessary elements of that process. They also set forth procedures governing planning process adoption, submission, revision, and Environmental Protection Agency (EPA) approval. The purpose of the planning process is to provide the states the water quality assessment and program management information to make centralized coordinated water quality management decisions. The process will also serve to encourage water quality objectives which acknowledge state policies for land use and other related natural resources. This information will enable the state to direct its resources, planning, monitoring, permitting, and financial assistance against water quality problems on a priority basis. Where water quality standard violations occur, an assessment will be made whether the application of best practical control technology for industry and secondary treatment for municipalities will correct the water quality problem. If not, maximum pollitant loads will be calculated. (Sperling-Florida)
W74-10071

EPA'S RUCKELSHAUS: 'FROM CARELESS INDIFFERENCE TO REMEDIAL ACTION',
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-10072

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM--PROPOSED FORMS AND GUIDELINES ACQUISITION OF INFORMATION FROM OWNERS AND OPERATORS OF POINT SOURCES.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 37, No 234, p 25898-25906, Dec. 5, 1972.

Descriptors: *Federal Water Pollution Control Act, *Regulation, *Administrative agencies, *Water pollution, *Water pollution control, Federal government, State governments, Permits, Water pollution sources, Pollution abatement, Sewage, Sewage treatment, Municipal wastes, Industrial wastes, Water policy, Water law, Effluents, Water quality, Water quality control, Water quality standards, Pollutants, Pollutant identification.
Identifiers: Federal Water Pollution Control Act Amendments of 1972, Administrative regulations.

The proposed forms and accompanying instructions describe requirements for the acquisition of information from owners and operators of point sources subject to the National Pollutant Discharge Elimination System, pursuant to the authority of the Federal Water Pollution Control Act Amendments of 1972. The Administrator of the Environmental Protection Agency may, after public hearings, issue permits for the discharge of any pollutant, upon condition that such discharge will meet all applicable requirements of the Act relating to effluent limitations, water quality standards, toxic and pre-treatment effluent standards and entry provisions. The Act also provides that states desiring to administer their own permit programs may submit a full and complete description of such a program to the Administrator for approval. With the exception of those facilities within the jurisdiction of a municipal wastewater treatment authority serving over 10,000 population, each operator of a point source of discharge of pollutants must complete and submit a short form which corresponds to the type of discharge as provided by the samples included in this proposed regulation. (Ritchie-Florida)
W74-10073

COMMUNITY ADOPTION OF WATER REUSE SYSTEMS IN THE UNITED STATES,
Clark Univ., Worcester, Mass.
For primary bibliographic entry see Field 5D.
W74-10081

REMOVAL OF OIL FROM AQUEOUS WASTES BY FLOTATION,
California Univ., Berkeley. Dept. of Chemical Engineering.
S. L. Goren.
Available from the National Technical Information Service as PB-234 023, $3.00 in paper copy, $1.45 in microfiche. Completion Report, California Water Resources Center, Davis, June 1974. (California Water Resources Center Project UCAL-WRC-W-276). 10 p, 4 fig, 2 ref. OWRR-A-034-CAL (3).

Descriptors: *Flotation, *Oil wastes, Wastes, *Electrolytes, *Separation techniques, Dispersion, Water pollution control, Waste water treatment, Oil pollution, Aqueous solutions.

The effects of electrolyte type and concentration on the separation of oil in water dispersions were examined experimentally. Flotation appears to be highly effective in removing droplets at high electrolyte concentrations or with aluminum sulfate under basic conditions. The efficiency of removal decreases with decreasing drop size limiting the effectiveness of flotation to droplets greater than several microns in diameter. (Snyder-California-Davis)
W74-10082

COST OF RURAL COMMUNITY WATER AND SEWER SYSTEMS COMPARED TO PRIVATE SYSTEMS,
South Dakota State Univ., Brookings. Agricultural Cooperative Extension Service.
For primary bibliographic entry see Field 6C.
W74-10098

WATER ATLAS OF THE UNITED STATES,
For primary bibliographic entry see Field 7C.
W74-10107

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CONSTRUCTION OF MILLSTONE NUCLEAR POWER STATION, UNIT 3, MILLSTONE POINT COMPANY, ET. AL.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-10109

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF RANCHO SECO NUCLEAR GENERATING STATION UNIT 1, SACRAMENTO MUNICIPAL UTILITY DISTRICT.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Report No. Docket 50312-121, $7.60/copy; $1.45/microfiche. Report No. Docket 50312-121, March 1973. 190 p, 17 fig, 27 tab, 87 ref, append.

Descriptors: *California, *Nuclear powerplants, Effluents, Environment, Administrative agencies, Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Pacific Ocean.
Identifiers: *Pressurized water reactors, Folsom South Canal, *Environmental impact statements.

This final environmental statement relates to the proposed continuation of construction permit and issuance of operating license for the Rancho Seco Nuclear Generating Station Unit 1. This nuclear plant is located in Sacramento County, California. The unit will employ a pressurized water reactor cooled with water from the Folsom South Canal and circulated through two natural-draft cooling towers. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes. It was concluded to continue the construction permit and issue an operating license for the facility subject to the following conditions: (1) do certain specified radiological monitoring; (2) define a comprehensive environmental monitoring program to cover plant operations; (3) conduct a rapid soil stabilization program near the plant site; and (4) provide a course of action to alleviate irreversible damage. (Houser-ORNL)
W74-10110

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2, TENNESSE VALLEY AUTHORITY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-10111

COMMERCIAL HIGH-LEVEL WASTE PROJECTIONS,
Oak Ridge National Lab., Tenn.
J. O. Blomeke, and J. P. Nichols.
Available from NTIS, Springfield, Va., as Rept. No. ORNL-TM-4224, $4.00/copy, $1.45/microfiche. Report No. ORNL-TM-4224, May 1973. 19 p, 12 tab, 9 ref.

Descriptors: *Radioactive wastes, *Nuclear wastes, *Forecasting, *Projections, Planning, Design criteria, Management, Estimating, Technology, Methodology, Assessment, Environmental effects, Radioactivity effects.

Projections of the industrial radioactive wastes from the nuclear fuel cycle over the remainder of this century are useful in the planning and design of techniques and facilities needed for their future management, and for the assessment of potential environmental effects. Projections are presented of the high-level solidified wastes to be generated through the end of this century by the U.S. nuclear power industry in the course of reprocessing spent reactor fuels. The installed nuclear electric capacity of the U.S. is taken as 134, 504, and 1200 GW at the end of calendar years 1980, 1990, and 2000, respectively. The reactor complex is assumed to consist of LMFBRs, HTGRs, and U- and Pu-fueled LWRs. It is estimated that the equivalent of 471,000 cu ft of high-level solidified wastes will have been generated through the year 2000, and that by 2010, when all of this waste has been shipped to a federal repository, it will contain 53,000 MCi of activity and evolve heat at a rate of 195 MW. (Houser-ORNL)
W74-10113

DECOMMISSIONING OF NUCLEAR FACILITIES - A BIBLIOGRAPHY.
Office of Information Services (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 6G.
W74-10119

FEEDLOT WASTE MANAGEMENT: PROGRESS AND OUTLOOK,
Texas A and M Univ., College Station. Dept. of Agricultural.
For primary bibliographic entry see Field 5D.
W74-10133

CLIMATE AND THE SELECTION OF A BEEF HOUSING AND WASTE MANAGEMENT SYSTEM,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10134

EFFECT OF CONSUMPTION OF SHAVINGS ON HEMATOLOGY OF TURKEY POULTS,
Georgia Univ., Athens. Dept. of Poultry Science.
For primary bibliographic entry see Field 5C.
W74-10136

FEEDLOTS POINT SOURCE CATEGORY: EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 32, p 5706-5707, February 14, 1974.

Descriptors: *Feed lots, *Livestock, Poultry, Hogs, *Effluents, *Farm wastes, Technology, Economics, Dairy industry, Waste treatment, *Water quality standards.
Identifiers: Open lot, Housed lot, Stall barn, Free stall barn, Milkroom, Milking center, Process waste water, Process generated waste water.

Environmental Protection Agency guidelines and standards involving feedlots and waste production are presented. The terms feedlot, process waste water, process generated waste water, 10 year-24 hour rainfall event, 25 year-24 hour rainfall event, open lot, housed lot, stall barn, free stall barn, milkroom, and milking center are defined. Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available are presented. Also effluent limitation guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable are discussed. Pretreatment standards for existing sources, standards for performance for new sources, and pretreatment standards for new sources of waste are also considered. (Russell-East Central)
W74-10139

WASTE MANAGEMENT AND ANIMAL PERFORMANCE IN BEEF FEEDLOTS,
Nebraska Univ., Omaha.
For primary bibliographic entry see Field 5D.
W74-10141

EXTENDED AERATION, CLARIFICATION AND ANAEROBIC TREATMENT CYCLE,
For primary bibliographic entry see Field 5D.
W74-10166

FURTHER FIELD INVESTIGATION ON AERATED LAGOONS IN THE CITY OF WINNIPEG,
Winnipeg Waterworks, Waste, and Disposal Div. (Manitoba).
For primary bibliographic entry see Field 5D.
W74-10167

THE EFFECTS OF WATER TEMPERATURE AND ELEVATION UPON AERATION,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10168

SOURCES OF OIL AND WATER IN BILGES OF GREAT LAKES SHIPS,
Michigan Univ., Ann Arbor. Dept. of Naval Architecture and Marine Engineering.
For primary bibliographic entry see Field 5B.
W74-10191

STORAGE AND DISPOSAL OF IRON ORE PROCESSING WASTEWATER,
Michigan Technological Univ., Houghton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10193

WATER LAW IN RELATION TO ENVIRONMENTAL QUALITY,
Organization: Colorado State Univ., Fort Collins. Dept. of Economics.
D. R. Allardice, G. E. Radosevich, K. R. Koebel, and G. A. Swanson.
Available from the National Technical Information Service as PB-234 144 $11.00 in paper copy, $1.45 in microfiche. Completion Report Series No. 55, Colorado State University Environmental Resources Center, Fort Collins, 561 p, 8 figures, 17 tables. March 1974. OWRR C-3107(No 3686)(2).

Descriptors: *Water law, *Prior appropriation, Riparian doctrine, Recreation, Trout streams, Beneficial use, Trout, Wisconsin, Montana, Fisheries, *Aesthetics, Low flow, *Social values, *Environmental effects.

The study was prompted because (1) of increased public concern over environmental quality; (2) but environmental degradation continues; (3) some basic water laws based upon the appropriation doctrine had no provisions for protecting environmental quality; (4) many state conservation laws have been enacted recently and an analysis of them should provide a basis for improving legal protection of environmental quality. Procedures include soliciting from several state agencies information upon the need for environmental legislation and the extent to which it had been met; reviewing and analyzing relevant literature and laws; and making site vists to 5 selected states to discuss the subjects with key officials and to inspect in the field the effectiveness of their legislation. Certain legislation is recommended for wider adoption. The unique public intervenor in Wisconsin appears highly effective. Successful stream preservation laws in several states (e.g., Montana, New York) depend upon cooperation between the state highway and conservation departments. Data presented include: participation in water based recreation projected to the year 2000; stream channel alteration, chiefly from highway construction; citations for 22 states which have wild and scenic river acts, 20 having state environmental policy acts, and 9 which have constitutional provisions regarding the environment.
W74-10202

VISCOSITY ACTUATED PHASE SEPARATING (VAPS), FOR OIL-WATER SEPARATIONS,
Union Carbide Corp., Bound Brook, N.J. Chemicals and Plastics.
R. H. Handwerk, D. J. Smith, and E. E. Griesser.
Available from NTIS, Springfield, Va 22151 as AD-763 552 Price $3.00 printed copy; $1.45 microfiche. Final Project Report 734305.2/5 to U S Coast Guard Office of Research and Development March 1973. 168 p, 25 fig, 6 tab, 16 ref. 4305 DOT-CG-24289-A.

Descriptors: *Separation techniques, *Oily water, Ships, *Viscosity, Water pollution control, *Oil pollution, *Pumps, Oil wastes, Water pollution treatment, *Pollution abatement, Oil-water interfaces.
Identifiers: *Tanker deballasting.

A viscosity-actuated phase separation (VAPS) was designed for the separation of oil and water for marine environments. An oil/water separator should eliminate oil discharge into the sea from all types of vessels. This objectives covers a broad range of oil types and volumes. Of particular difficulty, because of the high flow rates involved, are bilge pumping and tanker deballasting. Typical flow rates for bilge pumping are 100 gallons per minute while in tanker deballasting flow rates up to 10,000 gallons per minute are desirable. It is desired to reduce the oil content of the water discharge to a level of 10-20 ppm. Orbiting buttress thread devices were found to be ineffective in separating oil and water is 0.5 to 5% oil content feed streams due to excessive clearances caused by natural geometrics. The swept surface pumps tested as mechanical coalescers did some coalescing of the oil, but also produced a 'tail' of very small oil particles which were smaller than the smallest oil particles in the feed stream. The rotating buttress thread screw units can be used to separate oil and water in 0.5 to 5% oil content feed streams using oils having viscosities below 300 cp. The oil content of the discharge water was typically 100-300 ppm with some samples having less than 100 ppm. (Knapp-USGS)
W74-10231

MAN AND HIS ENVIRONMENT,
For primary bibliographic entry see Field 6G.
W74-10242

SEPARATION AND RECOVERY SYSTEMS, INC., 100-GALLON-PER-MINUTE OIL/WATER SEPARATOR,
Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
E. C. Russell.
Available from NTIS, Springfield, Va 22151 as AD-763 885 Price $3.00 printed copy; $1.45 microfiche. Final Report No 2060, May 1973. 20 p, 3 fig, 6 tab.

Descriptors: *Oily water, *Separation techniques, Emulsions, Water pollution control, Oil pollution, Waste water treatment, Ships, Sea water, Pollution abatement, Pumps.

An oily water separation system was tested to determine its suitability as a shipboard oil pollution control device. Prefilters or strainers should be included in all separation systems designed to process bilge water to help maintain coalescing efficiency and prolong element life. The supply pumps and transfer pumps used in all separation systems should be of a no-shear design with sufficient capacity to maintain rated flow with an increase in differential pressure across the system. (Knapp-USGS)
W74-10248

DEVELOPMENT OF A POLLUTION-FREE CARGO TANK CLEANING SYSTEM FOR USE ON BOARD TANKERS,
State University of New York Bronx. Maritime Coll.
For primary bibliographic entry see Field 5D.
W74-10249

COMPARATIVE ASPECTS OF COASTAL ZONE MANAGEMENT: BACKGROUND INFORMATION ON THE LAW OF TEXAS AND OTHER STATES IN VIEW OF THE COASTAL ZONE MANAGEMENT ACT OF 1972.
Texas Law Inst. of Coastal and Marine Resources, Houston.
For primary bibliographic entry see Field 6E.
W74-10272

REFINERY EFFLUENTS NEED EFFICIENT CONTROL.
For primary bibliographic entry see Field 5D.
W74-10274

DEHYDRATION OF SOLIDS BY CHEMICAL FRACTIONATION.
Boeing Co., Seattle, Wash.

Descriptors: *Patents, *Water purification, *Separation techniques, Liquids, Oil, Industrial plants, Equipment, *Distillation, *Waste water treatment.
Identifiers: Water purification tanks.

A surface layer of impurities is separated from a liquid, such as in separating an oil film floating on water, in which a flow of liquid is directed downwards onto the surface layer at sufficient speed to entrain the impurities. These are conducted to a non-contaminated region beneath the surface, where at the least the impurities are collected in a submerged opening connected to a suction source. This may be used also for removing floating scum from water purification tanks or other industrial plants. (Prague-FIRL)
W74-10282

CANADA: SEVERE PROBLEMS.
For primary bibliographic entry see Field 5D.
W74-10289

POTENTIAL ECONOMIC IMPACTS OF STATE POLLUTION CONTROLS ON DAIRY FARMS,
Michigan State Univ., East Lansing. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5D.
W74-10300

WASTE MANAGEMENT REGULATIONS AND PROPOSALS,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 5D.
W74-10312

ANNUAL LITERATURE REVIEW: ADMINISTRATION, SYSTEMS ANALYSIS,
Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 6A.
W74-10322

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

NETWORK FLOW MODELING OF MULTIRESERVOIR DISTRIBUTION SYSTEMS,
Texas Univ., Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 4A.
W74-09952

A PROPOSED OPEN BEACHES STATUTE FOR FLORIDA,
Miami Univ., Fla. Ocean Law Program.
For primary bibliographic entry see Field 2J.
W74-09977

APPLICATION OF SEASONAL PARAMETRIC LINEAR STOCHASTIC MODELS TO MONTHLY FLOW DATA,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
A. I. McKerchar, and J. W. Delleur.
Water Resources Research, Vol 10, No 2, p 246-255, April, 1974. 6 fig, 2 tab, 16 ref.

Descriptors: *Hydrologic aspects, *Flow data, *Model studies, Forecasting, Mathematical studies, *Seasonal, Hydrologic data, Logarithms.
Identifiers: *Stochastic models, Parameters, Autoregressive integrated moving average, Monthly flow data, Logarithms.

Stochastic linear models are fitted to hydrologic data for two main reasons: to enable forecasts of the data one or more time periods ahead and to enable the generation of sequences of synthetic data. Short sequences of data lead to uncertainties in the estimation of model parameters and to doubts about the appropriateness of particular time series models. A premium is placed on models that are economical in terms of the number of parameters required. One such family of models is multiplicative seasonal autoregressive integrated moving average (Arima) models. Illustrated is the process of identifying the particular member of the family that fits logarithms of monthly flows, estimating the parameters, and checking the fit. The seasonal Arima model accounts for the seasonal variability in the monthly means but not the seasonal variability of the monthly standard deviations: for this reason it value is limited. The forecasting of flows one or more months ahead is described with an example. (Prague-FIRL)
W74-10053

STUDY OF WATER QUALITY PREDICTION MODELS FOR USE IN ALABAMA,
Auburn Univ., Ala. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-10237

UNCERTAINTY ANALYSIS IN THE ECONOMIC EVALUATION OF IRRIGATION SYSTEMS,
Bradford Univ. (England).
For primary bibliographic entry see Field 3F.
W74-10321

ANNUAL LITERATURE REVIEW: ADMINISTRATION, SYSTEMS ANALYSIS,
Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.
D. P. Loucks.
Journal Water Pollution Control Federation, Annual Literature Review, Vol 46, No 6, p 1604-1611, June 1974. 59 ref.

Descriptors: *Water pollution control, *Waste water treatment, *Management, *Design, *Systems analysis, *Planning, *Decision making, Water quality, Simulation analysis, Linear programming, Dynamic programming, *Bibliographies, Optimization, Cost-benefit analysis, Mathematical models, Taxes, *Reviews.
Identifiers: Cost-effectiveness, Separable convex programming.

The 1973 literature on the development and application of systems analysis techniques for defining and evaluating alternative water pollution control policies can be divided into: (1) general reviews; (2) regional water quality management studies; (3) economic incentives; (4) data requirements and problems; (5) water reuse analyses, the design and operation of wastewater collection networks, wastewater treatment plants, instream artificial aeration devices, and flow augmentation systems; and (6) the analysis of specific pollution problems resulting from acid mine drainage, DDT, nitrogen and thermal wastewater. Fifty-nine such documents (books, articles, and reports) pertinent to the field of wastewater treatment and water pollution control are summarized. The writings include a broad spectrum of mathematical modeling techniques, such as simulation analysis, mixed integer programming, input-output analysis, linear and nonlinear programming, dynamic programming, and other optimization methods, to estimate feasible and often minimum-cost design and management alternatives for water quality planning. (Bell-Cornell)
W74-10322

WATER-DISTRIBUTION RESEARCH AND APPLIED DEVELOPMENT NEEDS.
American Water Works Association, New York. Research Committee on Distribution Systems.
For primary bibliographic entry see Field 4A.
W74-10323

OPTIMAL PUMPING FOR AQUIFER DEWATERING,
Stanford Univ., Calif. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-10325

6B. Evaluation Process

EVALUATION AND IMPLEMENTATION OF URBAN DRAINAGE AND FLOOD CONTROL PROJECTS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
N. S. Grigg, L. Rice, L. H. Botham, and W. J. Shoemaker.
Available from the National Technical Information Service as PB-233 785 $4.75 in paper copy, $1.45 in microfiche. Colorado Environmental Resources Center, Ft. Collins, June 1974, Completion Report Series No 56. 134 p, 16 fig, 13 tab. OWRR B-086-COLO(1), 14-31-0001-4064.

Descriptors: Benefits, Budgeting, Cities, Drainage, Drainage practices, *Drainage programs, *Economic justification, Feasibility, Financial feasibility, Flood plains, *Project benefits, Runoff, *Storm drains, *Cost-benefit analysis, Financing, *Urban drainage, *Flood control, Project benefits, Project planning.
Identifiers: Drainage law.

Urban drainage and flood control (UDFC) systems provide a service to urban areas with three basic components; flood control, convenience drainage and environmental sanitation. This service is one of many provided by local government and must compete for public funding with other more visible programs such as education, transportation and public safety. The evaluation problem for UDFC arises when the merit of individual UDFC systems must be determined, when competing UDFC projects must be ranked, when optimal investment timing is sought and when the incidence of UDFC benefits and costs must be known. The results of all of these evaluations affect the funding of the UDFC sector, in competition with other public programs. UDFC systems are normally identified as minor or major in character, the former providing for the drainage of frequent runoff events, the latter providing for the rarer runoff events. The major UDFC system normally provides substantial flood damage reduction benefits while the minor system provides intangible benefits. An interim methodology for evaluating major UDFC projects is presented. It considers mostly flood damage benefits because limited data on them is available. Planned extension of the methodology will incorporate more formally intangible and indirect benefits. Because of the legal problems associated with indentifying and quantifying benefits a state-of-the-art survey on the legal basis for establishing benefits is presented. It contributes to the difficult area of financing, and implementation, necessary if UDFC are to be ultimately provided where they are needed.
W74-09802

APPLICATION OF THE LUNR INVENTORY SYSTEM FOR WATER RESOURCES PLANNING AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN,
Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
J. T. Roach, and J. W. Kelley.
Available from the National Technical Information Service as PB-233 841 $5.00 in paper copy, $1.45 in microfiche. Technical Report No 72, Water Resources and Marine Sciences Center, Cornell University, Ithaca, N.Y., April 1974. 11 fig, 15 tab, 60 ref, Partial Completion Report. OWRR B-031-NY(1), 14-31-0001-3916.

Descriptors: *Computer programs, *Data storage and retrieval, River basins, Remote sensing, Aerial photography, *Natural resources, Water resources, Planning, Management, *Land use, Information, *New York, Costs, Watersheds(Basins), Flood plains, Soil surveys, Topographic mapping, Pollution abatement, *Watershed management, Time series analysis.
Identifiers: *Susquehanna River Basin(N.Y.), Geographic referencing, Identification, Environmental impact, *Inventories, Elmira(N.Y.), Horseheads(N.Y.).

A study is made of the Land Use and Natural Resources inventory (LUNR) of New York State to demonstrate its application and management in the Susquehanna River Basin. The feasibility of combining in one data bank information needed for comprehensive water resources planning and management is explored. LUNR is a computer-based system of data storage and retrieval; it accomodates point, area and linear information which is identified, located and stored according to a geographic referencing system. Much information is obtained from remote sensing, but the system is very flexible. It is held that what occurs on the land in a river basin has an impact upon the water resources of that basin. The development, characteristics and intracacies of the LUNR system are described. First an overview and chronology are presented; data sources, base maps, scale, geographic referencing, information classification, and more are evaluated in detail. Next, examples of LUNR applications in the Susquehanna River Basin are considered. Watershed management with emphasis on flood plains, is considered in some detail. The monitoring, prediction and updating capabilities are demonstrated in a time analysis study of the Elmira-Horseheads area. Selection of appropriate imagery scale is important in terms of inventory cost and required information detail. LUNR applicability for pollution detection and surveillance and for review of environmental impact studies is discussed. It is concluded that a LUNR type natural resources inventory system with emphasis on water resources can indeed be developed for the Susquehanna River Basin. (Bell-Cornell)
W74-09807

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Division of Waste Management and Transportation (AEC), Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-09839

ENVIRONMENTAL PROTECTION AND ADMINISTRATIVE CHANGE IN STATE WATER

MANAGEMENT IN THE PACIFIC COAST STATES,
California Univ., Davis. Dept. of Political Science; and California Univ., Davis. Div. of Environmental Studies.
For primary bibliographic entry see Field 6E.
W74-09951

LONG ISLAND SOUND,
For primary bibliographic entry see Field 5C.
W74-09957

THE UNCERTAIN SEARCH FOR ENVIRONMENTAL POLICY: THE COSTS AND BENEFITS OF CONTROLLING POLLUTION ALONG THE DELAWARE RIVER,
Pennsylvania Univ., Pa.
For primary bibliographic entry see Field 5G.
W74-09999

THE PLANNING OF A CORPS OF ENGINEERS RESERVOIR PROJECT: LAW, ECONOMICS AND POLITICS,
Illinois Univ., Urbana.
R. W. Findley.
Ecology Law Quarterly, Vol 3, No 1, p 1-106, Winter 1973. 553 ref.

Descriptors: *Water resources planning, *Cost-benefit analysis, History, *River basin development, *Flood control, Civil engineering, Alternative planning, Project planning, Area redevelopment, Legislation, Multiple-purpose projects, Riparian rights, Economics, Governmental interrelations, Local governments, Environmental effects, Water pollution.
Identifiers: *National Environmental Policy Act.

The Oakley reservoir project of the Army Corps of Engineers is studied in detail from its inception in 1939, through significant alterations in design and purposes, to its present status as a matter of political and legal controversy. The historical treatment elucidates the process by which a governmental agency's decisions evolve through interplay with other governmental entities and with private interests. The decision-making process followed by the Corps of Engineers in the planning of reservoir projects is analyzed critically. Special attention is given to the factors hindering adequate consideration of alternatives, to the problems of benefit-cost analysis, and to the grounds for judicial review of Corps planning decisions. The Corps' formulation and evaluation of the Oakley project is found to have been deficient in many respects, producing inaccurate estimates of benefits and costs and failing to satisfy the requirements of the National Environmental Policy Act. (Craig-Florida)
W74-10064

HOW THE STUDY STANDS NOW: INVENTORY PHASE NEARLY COMPLETE; PLANNING PHASE BEGUN.
The Urban Sea, (1974). 8 p 11 photo.

Descriptors: *River basins, *Water resources, *Water demand, *Water supply, *Water utilization, *Land use, River basin commissions, River basin development, Environmental effects, Estuaries, Urban sociology, Social aspects, Regional analysis, Water resources development, Flood plains, Legal aspects, Recreation, Water quality control, Water policy, Electric power, Project planning.
Identifiers: *Long Island Sound.

This report represents the completion of the data gathering phase of the Long Island Sound Study and attention has turned to preparing alternative planning proposals for the future. Previously published interim reports are briefly discussed, including reports concerning electric power generation, mineral resources and mining, flood plains, soils, erosion and sedimentation, as well as sources and movement of water. A summary of goals and objectives, recommendations and suggestions from the Citizen Advisory Committee is set forth. Goals were written for numerous areas, including land use and solid waste disposal, water management (both water quality and water supply), shoreline appearance and design, erosion, flood damage, recreation, fish and wildlife, transportation, minerals and mining, energy production and needed legal mechanisms. Land use issues are studied from the planner's perspective, as protection of water bodies and estuarine areas cannot be considered in isolation from general metropolitan and urban growth requirements. The study region is considered with the New York metropolitan area, and possible trends and development implications such as housing and employment are analyzed. (Sutton-Florida)
W74-10080

COMMUNITY ADOPTION OF WATER REUSE SYSTEMS IN THE UNITED STATES,
Clark Univ., Worcester, Mass.
For primary bibliographic entry see Field 5D.
W74-10081

WATER ATLAS OF THE UNITED STATES,
For primary bibliographic entry see Field 7C.
W74-10107

WATER MANAGEMENT AT ITS BEST.
Bureau of Reclamation, Washington, D.C.
Report on Water and Land Supervisors' 13th Conference, September 27-October 1, 1971, Santa Fe, N.M. 81 p.

Descriptors: *Water resources, *Water resources development, *Federal project policy, *Federal Reclamation Law, *Reclamation, Recreation, Land use, Water supply, Watershed management(Applied), Water utilization, Irrigation, Cost allocation, Cost repayment, Government finance, Inter-agency cooperation, Resources development, Water law, Legal aspects, Project planning, Cost-sharing, Water policy, Data processing, Social aspects.

Numerous conclusions and recommendations regarding development and management of resources on reclamation projects are presented. The Bureau of Reclamation should give greater recognition to the value of its recreational resources and its responsibilities for their development and management to maximize recreation benefits to the public. The Bureau should also actively pursue cooperative programs with local government and water user organizations to replace hazardous open channels with pipe, and should increase its research and support of programs leading to registration of selected herbicides for irrigation system use. A small action group, familiar with cost allocation procedures, was suggested to study the physical and financial characteristics of water use and current contractual procedures for handling changes in land and water use. Studies should be initiated to identify all beneficiaries of water resource projects to consider requiring such beneficiaries to assist with repayment of the associated federal investment. (Ritchie-Florida)
W74-10271

A METHODOLOGY FOR PLANNING LAND USE AND ENGINEERING ALTERNATIVES FOR FLOODPLAIN MANAGEMENT,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4A.
W74-10277

UNCERTAINTY ANALYSIS IN THE ECONOMIC EVALUATION OF IRRIGATION SYSTEMS,
Bradford Univ. (England).
For primary bibliographic entry see Field 3F.
W74-10321

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

COST OF RURAL COMMUNITY WATER AND SEWER SYSTEMS COMPARED TO PRIVATE SYSTEMS,
South Dakota State Univ., Brookings. Agricultural Cooperative Extension Service.
F. F. Kerr, and R. Swartout.
Extension Fact Sheet 469, 5 p, 4 tab.

Descriptors: *Rural areas, *Cost comparisons, Economics, *Sewers, *South Dakota.
Identifiers: Community water systems, *Private water systems, Sewer systems.

A simple cost analysis sheet is provided for use by individuals in rural areas to compute the economic advantage or disadvantage in joining a community water system. A series of tables are included that show the initial cost of an installed plumbing and water system and the average annual installed cost of home systems that deliver quality water under pressure or by constant flow. In the example given, it would be an economic disadvantage to join the community system if the estimated monthly charge for pressurized delivery would be more than $24.85, or the constant flow delivery more than $23.36. This analysis considers only the dollar advantage or disadvantage of joining a community system. The convenience offered by water service from a community source may be of sufficient value to some individuals to justify its use even if an economic disadvantage results. Normally the need for a community system becomes apparent when the water quality of a home system becomes inferior, when the quantity of water delivered is inadequate, or when the cost of a home system is prohibitive. (Campbell-NWWA)
W74-10098

6D. Water Demand

ECONOMIC ANALYSIS OF WATER SUPPLY NEEDS AND ALTERNATIVES IN A MULTI-COUNTY INDUSTRIAL AREA,
Clemson Univ., Dept. of Agricultural Economics and Rural Sociology.
G. H. Liner , and J. M. Stepp.
Available from the National Technical Information Service as PB-233 842 $4.50 in paper copy, $1.45 in microfiche. Report No 41, Water Resources Research Institute, Clemson University, Clemson, South Carolina, April 1974. 102 p, 10 fig, 10 tab, 42 ref, 5 append. OWRR A-021-SC(2).

Descriptors: *Water supply, *Water demand, Estimating, Long-term planning, Methodology, *Projections, *Regional analysis, *South Carolina, Water utilization, Water sources, *Alternative planning, Cost comparisons, Industrial water.
Identifiers: Alternative supply sources, Comparative economic analysis, Raw water costs, Carolina Piedmont Area, *Broad River(S.C.).

Economic, population and water use data were projected until 2020 for the 10 South Carolina counties lying wholly or partially in the basin of the Broad River, a major component of the Santee River system. An effort to make projections for subcounty areas was unsuccessful; hence the county is the unit of analysis. Actual and potential dependable water supplies in each county were estimated, and the counties with potential shortages by 2020 were identified. Two of the counties, Greenville and Spartanburg, which are adjacent to each other and could therefore use a

combined supply system, were found to be in need of 'importing' water during the period covered by the study. Several alternative water supply systems involving two sources of water were analyzed. The two sources are a proposed U.S. Army Corps of Engineers reservoir (the Clinchfield Project) in North Carolina just north of Spartanburg County, and the Duke Power Company's almost completed Keowee-Toxaway Project some 25 miles west of Greenville. Under practically all the assumptions regarding charges for water f.o.b. the source of supply, the least-cost plan was for the counties to have separate and different sources of supply. However, it was concluded that certain fairly plausible political and legal developments could render a combined system desirable.
W74-09808

WATER DEMANDS FOR EXPANDING ENERGY DEVELOPMENT,
Geological Survey, Reston, Va.
G. H. Davis, and L. A. Wood.
Geological Survey Circular 703, 1974. 14 p, 4 fig, 3 tab, 14 ref.

Descriptors: *Water demand, *Energy, *Thermal powerplants, Nuclear powerplants, Coal mines, Oil fields, Water quality, Cooling water, Industrial water.
Identifiers: Energy development.

Water is used in producing energy for mining and reclamation of mined lands, onsite processing, transportation, refining, and conversion of fuels to other forms of energy. In the East, South, Midwest, and along the seacoasts, most water problems are related to pollution rather than to water supply. West of about the 100th meridian, however, runoff is generally less than potential diversions, and energy industries must compete with other water users. Water demands for extraction of coal, oil shale, uranium, and oil and gas are modest, although large quantities of water are used in secondary recovery operations for oil. The only significant use of water for energy transportation, aside from in-stream navigation use, is for slurry lines. Substantial quantities of water are required in the retorting and the disposal of spent oil shale. The conversion of coal to synthetic gas or oil or to electric power and the generation of electric power with nuclear energy require large quantities of water, mostly for cooling. Withdrawals for cooling of thermal-electric plants is by far the largest category of water use in energy industry, totaling about 170 billion gallons per day in 1970. Water availability will dictate the location and design of energy-conversion facilities, especially in water deficient areas of the West. (Knapp-USGS)
W74-09949

WATER RECYCLING IN SOUTHERN CALIFORNIA,
For primary bibliographic entry see Field 5D.
W74-09962

SUMMARY OF FINDINGS CONCERNING WATER,
For primary bibliographic entry see Field 5C.
W74-09964

A BILL TO AUTHORIZE THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE CIBOLO PROJECT, TEXAS, AND FOR OTHER PURPOSES.
House Bill 11177, 93d Cong, 1st Sess (1973). 5 p.

Descriptors: *Legislation, *Federal reclamation law, *Water sources, *Water supply, Water storage, Water utilization, Water management(Applied), Consumptive use, Resources development, Conservation, Fish, Wildlife, Recreation, Dams, Reservoirs, Flood control, Government financing, *Texas, Multiple-purpose projects, Impoundment, Impounded waters.
Identifiers: *Cibolo project(Tex).

The Secretary of the Interior is authorized to construct, operate and maintain the Cibolo project, Texas, in accordance with the federal reclamation laws. The Secretary may take necessary actions for the purposes of storing, regulating and furnishing water for municipal and industrial use, conserving and developing fish and wildlife resources, providing outdoor recreation opportunities and controlling floods. the principal features of the project shall consist of a dam and reservoir on Cibolo Creek and public outdoor recreation facilities. The Secretary is authorized to enter into a contract with a qualified entity for delivery of water and for repayment of all the reimbursable construction costs. The conservation and development of the fish and wildlife resources and the enhancement of recreational opportunities in connection with this project shall be in accordance with provisions of the Federal Water Project Recreation Act. In excess of twenty million dollars is authorized to defray construction costs of the Cibolo reclamation project allocable to flood control, fish and wildlife, and recreation. (Ritchie-Florida)
W74-09978

HOW THE STUDY STANDS NOW: INVENTORY PHASE NEARLY COMPLETE; PLANNING PHASE BEGUN.
For primary bibliographic entry see Field 6B.
W74-10080

6E. Water Law and Institutions

INSTITUTIONAL FACTORS IN THE CREATION OF LOCAL SANITARY DISTRICTS IN WISCONSIN,
Wisconsin Univ., Madison. Land Tenure Center.
For primary bibliographic entry see Field 5D.
W74-09811

ENVIRONMENTAL PROTECTION AND ADMINISTRATIVE CHANGE IN STATE WATER MANAGEMENT IN THE PACIFIC COAST STATES,
California Univ., Davis. Dept. of Political Science; and California Univ., Davis. Div. of Environmental Studies.
G. Wandesforde-Smith.
Available from the National Technical Information Service as PB-233 931 $4.00 in paper copy, $1.45 in microfiche. Completion Report, California Water Resources Center, Davis, June 1974, 75 p. (California Water Resources Center Project UCAL-WRC-W-337). OWRR-B-142-CAL (2).

Descriptors: *State governments, *Federal government, Water resources development, *Administrative decisions, *Decision making, Social values, *Management, Social change, *Environmental control, Water pollution control, Institutions, Legal aspects.
Identifiers: *Public policy, Pacific Coast States(U.S.), *Environmental protection.

It seemed most appropriate in 1971 to propose a study of the consequences for state water agencies of the administrative changes then being introduced and contemplated in an effort to have environmental values incorporated more fully into decision making. In the previous decade there had been renewed interest on the part of all levels of government in the United States in the use, development, and management of water resources. To a large extent this interest was stimulated by the work of the Senate Select Committee on National Water Resources and by the possibility, which became apparent to some at the beginning of the 1960s, that the nation might face a water crisis. The interest has been sustained by the activities of the institutions created by the Water Resources Research Act of 1964, the Water Resources Planning Act of 1965, and the National Water Commission Act of 1968, as well as by a series of federal enactments relating to water pollution control. It is suggested that, at least in the short run and probably for some time in the future, the capacity of state water agencies to make more adequate decisions may have been substantially reduced as a result of some of the changes in administrative structure and procedures recently instituted. (Snyder-California, Davis)
W74-09951

AREAWIDE WASTE TREATMENT MANAGEMENT PLANNING IN THE WASHINGTON METROPOLITAN REGION: 1972 AMENDMENTS TO THE FEDERAL WATER POLLUTION CONTROL ACT, SECTION 208.
For primary bibliographic entry see Field 5D.
W74-09973

AMERICAN FALLS DAM, MINIDOKA PROJECT, IDAHO.
P.L. 93-206, 87 Stat. 904, 1973, U.S. Code Congressional and Administrative News, p 5117-5119.

Descriptors: *Water storage, Dams, *National recreation area, *Dam construction, *Bank erosion, *Reservoir storage, Federal jurisdiction, Water law, State jurisdictions, Appropriation, Erosion control, Flood routing, Reservoir operation, Supervisory control, Water demand, Engineering structures, Impounded waters, Reservoir fisheries, Reservoir sites, Reservoir yield, Administrative agencies, Hydroelectric plants, Cost sharing, Water resources development, Water management(Applied), Water policy, *Idaho.

The Secretary of the Interior is authorized to enter into negotiations and agreements with the American Falls Reservoir District or other appropriate agencies for the construction of a dam and related facilities to replace the existing American Falls Dam of the Minidoka project. The construction and operation of the replacement dam shall not result in an increase in the elevation of the reservoir water surface maintained by the original dam. Correction and prevention of any erosion related to the reservoir is provided as well as compensation for any unavoidable erosion to adjoining landowners. Proportionate storage rights of present space holders in the American Falls Reservoirs is unchanged by the new dam project. The constructing agency may contract with non-federal entities for the use of falling waters to generate hydroelectric power. The Secretary must approve all designs and specifications for the construction of the dam. The Secretary is also authorized to provide specific facilities for public recreation and fish and wildlife enhancement. Such facilities are financed by the Federal Water Project Recreation Act. (Kelly-Florida)
W74-09974

EXECUTIVE ORDER NO. 11735: ASSIGNMENT OF FUNCTIONS UNDER SECTION 311 OF THE FEDERAL WATER POLLUTION CONTROL ACT.
U.S. Code Congressional and Administrative News, p 2797-2800, 1973.

Descriptors: *Pollution abatement, *Administrative agencies, *Water pollution control, *Supervisory control(Power), Federal government, Administration, Regulations, Administrative decision, Jurisdiction, Coordination, Decision making, Pollutant identification, Water pollution sources, Ships, Water pollution treatment, Oil, Oil wastes, Inter agency cooperation, Federal Water Pollution Control Act.

The Administrator of the Environmental Protection Agency is empowered to exercise the Pre

sident's authority under the Federal Water Pollution Control Act concerning the discharge of oil and hazardous substances, the identification of dispersants and other chemicals and the abatement of actual or threatened discharges from onshore or offshore facilities. He is also empowered to establish procedures, equipment, and methods to implement the abatement. The Secretary of the Department in which the Coast Guard is operating is authorized to secure the necessary relief to abate the actual or threatened discharge of oil or hazardous substances from transportation-related onshore and offshore facilities, to inspect vessels carrying such substances and to arrest persons violating the Act and its amendments. The Federal Maritime Commission is authorized to issue regulations governing evidence of financial responsibility for vessels to meet liability to the United States. The Council on Environmental Quality is authorized to provide for the preparation, publication, revision or amendment of a National Contingency Plan for the removal of oil and hazardous substance discharges. The Coast Guard is designated the appropriate agency for receiving the notice of discharge of oil or hazardous substances. (Kelly-Florida)
W74-09975

EXECUTIVE ORDER NO. 11747: DELEGATING AUTHORITY UNDER THE WATER RESOURCES PLANNING ACT.
U.S. Code Congressional and Administrative News, p 4586, 1973.

Descriptors: *River basins, *Water law, *Federal government, *Administration, *Administrative agencies, Regulation, Legislation, Supervisory control(Power), Administrative decisions, Project planning, Decision making, Planning, Water management(Applied), River basin commissions, Water resources, Water resources development, Water policy.
Identifiers: Administrative regulations.

The President of the United States by virtue of authority vested in him by section 301 of title 3 of the United States Code designates and empowers the Director of the Office of Management and Budget to perform the functions vested in the President by sections 104(b) and 204(3) of the Water Resources Planning Act. The Director is authorized therein to review and to revise plans of the river basin commissions and to transmit these plans to Congress with appropriate recommendations. He is also authorized to implement the President's powers under section 301(b) of the Act with respect to approving rules, procedures, arrangements, and provisions relating to coordination of federal planning assistance programs and utilization of federal agencies administering related programs. The Chairman of the Water Resources Council is designated and empowered to fulfill the approval function for standards and procedures vested in the President by section 103 of the Water Resources Planning Act, as amended. (Kelly-Florida)
W74-09976

A PROPOSED OPEN BEACHES STATUTE FOR FLORIDA,
Miami Univ., Fla. Ocean Law Program.
For primary bibliographic entry see Field 2J.
W74-09977

A BILL TO AUTHORIZE THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE AND MAINTAIN A LARGER AND ADEQUATE SPILLWAY, AND TO IMPROVE THE UPSTREAM SLOPE PROTECTION ON BELLE FOURCHE DAM, BELLE FOURCHE PROJECT, BELLE FO URCHE, SOUTH DAKOTA, AND FOR OTHER PURPOSES.
Senate Bill 2403, 93d Cong, 1st Sess (1973). 2 p.

Descriptors: *South Dakota, *Legislation, *Dams, *Financing, *Construction, Spillways, Reservoirs, Water storage, Slope protection, Floods, Flood control, Safety, Costs, Engineering structures, Structural engineering.
Identifiers: Belle Fourche(S.D.).

This bill, introduced by Senators McGovern and Abourezk of South Dakota, would authorize the Secretary of the Interior to construct, operate and maintain a larger and adequate spillway, and to improve the upstream slope protection on Belle Fourche Dam in Belle Fourche, South Dakota. The Secretary would also be empowered to modify or add to the structures if necessary, for the purposes of meeting flood and emergency conditions which would otherwise result in loss of life or property. Construction authorized by this Act shall be for flood control and safety of dams and not for the purpose of providing additional conservation storage capacity, or developing benefits over and above those provided by the original dam and reservoir. For these purposes, $3,250,000 is authorized plus or minus such amounts as may be justified by reason of changes in construction costs. (Ritchie-Florida)
W74-09979

A BILL AUTHORIZING THE CONSTRUCTION OF A DAM AND RESERVOIR ON THE LITTLE WHITE RIVER, SOUTH DAKOTA (ROSEBUD SITE).
Senate Bill 2402, 93d Cong, 1st Sess (1973). 2 p.

Descriptors: *South Dakota, *Legislation, *Dams, *Construction, *Financing, Flood control, Recreation, Sediment control, Water supply, Flow, Regulation, Irrigation, Hydroelectric power, Rivers, Reservoirs, Reservoir construction, Drainage, Federal government, Appropriations, Beneficial use, Impoundments, Multiple-purpose reservoirs.
Identifiers: *Little White River(S.D.).

This bill, introduced by Senator McGovern and Senator Abourezk of South Dakota, would authorize the Chief of the Army Corps of Engineers to plan, construct and operate a multiple-purpose dam and reservoir on the Little White River (Rosebud Site) just north of the Mellette-Todd County line. The structures would be built in the interest of flood control, recreation, sediment storage, water supply, low-flow, regulation, limited irrigation and hydroelectric power. (Ritchie-Florida)
W74-09980

COASTAL WETLANDS PROTECTION LAW.
Miss. Code Ann., secs. 49-27-1 thru 49-27-29 (Supp. 1973).

Descriptors: *Mississippi, *Permits, *Wetlands, *Aquatic habitats, Conservation, Legislation, Administration, Adoption of practices, Coastal Structures, State governments, Regulation, Wildlife conservation, Shore protection, Coastal engineering, Piers, Docks, Public health, Decision making, Environmental effects, Plants, Highways, Recreation, Water sports, Animals, Legal aspects, Economic aspects, Administrative agencies, Project planning, Water pollution sources.
Identifiers: *Administrative regulations, Certification, Coastal waters, Environmental impact statement, Fill permits.

It is declared a Mississippi state policy to favor the preservation of the natural state of the coastal wetlands and their ecosystems. Exceptions to this policy of preservation are granted when a specific alteration of the wetlands would serve a higher public interest. A permit is required for dredging, filling, killing the fauna and flora, and for any structure which materially affects the ebb and flow of the tide. Permits are not required for state agencies, riparians, or for hunting or recreational activities. Each application for a permit will include a detailed description of the proposed activity and a map showing the area of coastal wetlands to be affected. The map will also show the location and area of other regulated activities, as well as all existing and proposed structures. The application will also include the project cost and purpose, along with a description of the public benefit to be derived from the project. Measures to be taken to reduce off-site effects and an environmental impact statement should be included. (Sperling-Florida)
W74-09981

POWER PLANTS AND COTTONTAILS,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 5G.
W74-09982

INVERSE CONDEMNATION--STREAM POLLUTION AS TAKING OF PROPERTY FOR PUBLIC USE.
For primary bibliographic entry see Field 5G.
W74-09983

LABAUVE V. LOUISIANA WILDLIFE AND FISHERIES COM'N. (ACTION TO ENJOIN ENFORCEMENT OF STATUTE).
289 So. 2d 150 (La. 1974).

Descriptors: *Commercial fishing, *Louisiana, *Fish conservation, *Constitutional law, *Equity, *Judicial decisions, Regulation, Water law, Legislation, Fish management, Wildlife conservation, Fisheries, Marine fisheries, Bodies of water, Water resources, Law enforcement, State governments, Water rights, Legal review, Legal aspects.

Plaintiffs, commercial fishermen, brought action against the Louisiana Wildlife and Fisheries Commission to enjoin enforcement of a criminal statute prohibiting the use of gill nets south of the Intracoastal Canal in Terrebonne and Lafourche Parishes. The Civil District Court granted injunctive relief and appeal was taken. The Supreme Court of Louisiana reversed on the ground that equity powers will be invoked to restrain the enforcement of criminal statutes only where the complaining party establishes the clear invasion of a property right, threatened irreparable injury, and the manifest unconstitutionality of the statute. The plaintiff had no proprietary interest in the fish he was prevented from catching; the fish were in state waters, and ownership of all fish existing in state waters is in the state. Plaintiff's fishing license was a privilege granted by the state, and the state had the right to interfere with this privilege in the exercise of its police powers. (Hunter-Florida)
W74-09984

A BILL TO EXPAND THE NATIONAL FLOOD INSURANCE PROGRAM BY SUBSTANTIALLY INCREASING LIMITS OF COVERAGE AND TOTAL AMOUNT OF INSURANCE AUTHORIZED TO BE OUTSTANDING AND BY REQUIRING KNOWN FLOOD-PRINE COMMUNITIES TO PARTICI PATE IN THE PROGRAM, AND FOR OTHER PURPOSES.
Senate Bill 1495, 93d Cong, 1st Sess (1973). 13 p.

Descriptors: *Legislation, *Floods, *Flood plain insurance, Insurance, Compensation, Costs, Damages, Protection, Flood damage, Flood plain zoning, Non-structural alternatives, Flood protection, State governments, Cities, Government financing, Economics, Governmental interrelations, Disasters, Federal government.
Identifiers: *National Flood Insurance Act of 1968.

The Congress has found that annual losses from floods and mudslides are increasing at an alarming rate, largely as a result of the accelerating development of, and concentration of population in, areas of flood and mudslide hazards. The purpose of this

bill, the Flood Disaster Protection Act of 1973, is therefore, to substantially increase the limits of coverage authorized under the national flood insurance program. It also provides for the expeditious identification of, and the dissemination of information concerning, flood-prone areas. States and local communities, as a condition of future Federal financial assistance, must participate in the flood insurance program and must adopt adequate flood plain ordinances with effective enforcement provisions consistent with Federal standards to reduce or avoid future flood losses. The bill also requires the purchase of flood insurance by property owners who are being assisted by Federal programs. This bill thus amends the National Flood Insurance Act of 1968 by increasing the limits of coverage for each particular type of property and also raises the limitation on coverage outstanding under that Act to ten billion dollars. The Secretary of Housing and Urban Development is authorized to issue regulations to carry out this Act. (Ritchie-Florida)
W74-09985

POLLUTION CONTROL: PRELIMINARY MANDATORY INJUNCTION TO PREVENT, CORRECT OR REDUCE EFFECTS OF POLLUTING PRACTICES,
J. J. Michalik.
49 ALR3d 1239 (1973).

Descriptors: *Judicial decisions, *Pollution abatement, *Industrial wastes, *Water quality control, *Legal aspects, Watershed management, Mining, Coal mines, Mine wastes, Mine water, Strip mine wastes, Waste dumps, Waste disposal, Pollution control, Pollutants, Contaminants, Chemicals, Chemical wastes, Water pollution sources, Water pollution, Chemical waste discharge, Pennsylvania, Texas, Bayous, Watershed protection, Pollution effects.

This annotation collects the cases in which the courts have expressly considered the use of a preliminary mandatory injunction as a means of preventing, correcting or reducing the effects of polluting practices. Very stringent prerequisites must be demonstrated before the courts will issue a mandatory injunction of this nature. The right of the applicant must be clear, the injunction must be necessary to prevent irreparable or serious inuury, and the applicant's remedy at law must be inadequate. Only two cases have been found in which preliminary mandatory injunctions have been considered. In West Penn Water Co. v. Sunnyhill Coal Co., the court refused to grant the injunction to prevent further contamination or pollution of a public water company's water supply by three coal companies' mining operations, on the grounds that the damage was already done and could not be undone by any available remedy. The court in Rhodia, Inc. v. Harris County, however, in an action to restrain a chemical company from discharging wastes containing excessive arsenic into or adjacent to a bayou, sustained those provisions of the injunction requiring the company to do whatever was necessary to prevent surface and tidal waters from carrying the arsenic to the bayou. (Silber-Florida)
W74-09986

PRESIDENT'S MESSAGES: VETO OF H.R. 3298--RURAL WATER AND SEWER GRANTS.
U.S. Code Congressional and Administrative News, p 863, 864, 1973.

Descriptors: *Utilities, *Public utilities, *Public works, *Federal project policy, *Community development, Water works, Water supply, Water distribution(Applied), Local governments, Sewerage systems, Sewerage disposal, Federal government, Federal budget, Political aspects, Legislation, Laws, Constitutional law, Water utilization, Rural areas, Projects.

In 1973, the President vetoed H.R. 3298, in which Congress sought to revive a program of Federal grants for rural water and sewer projects. The President had terminated the program earlier through the impoundment of funds. In his veto message, the President severely criticized the effects of the program as unjustifiably increasing taxes, and doubly taxing the nonrural taxpayer. In addition, the program made the federal government responsible for services which are local in nature, and induced some rural communities to delay construction of water and sewer facilities while they wait in line for federal subsidies. The President questioned the constitutionality of the bill's provision which mandates the spending of the full amount appropriated. In encouraging Congress to sustain his veto, the President noted that the 1974 budget already includes $345 million in Rural Development loan funds and that the Environmental Protection Agency will be providing $5 billion in 1973 and 1974 for waste disposal. The President promised that, if his veto was sustained, he would use his authority to provide rural communities with loans for water and sewerage facilities. (Hunter-Florida)
W74-09987

ARKANSAS RIVER BASIN COMPACT.
U.S. Code Congressional and Administrative News, P.L. 93-152; 87 Stat. 569, p 4081-4089, 1973.

Descriptors: *Interstate compacts, *River basin development, *River regulation, *Water yield, *Legislation, River basins, Basins, River basin commissions, River systems, Watersheds, River flow, River forecasting, Streamflow forecasting, Interstate commissions, Riparian waters, Arkansas, Oklahoma, Interstate rivers, Equitable apportionment, Water policy, Watershed management, Watershed protection, Water conservation, Water storage, Water supply, Water utilization, Water pollution abatement, Water pollution control, Water resources development.
Identifiers: *Arkansas River.

A compact between Arkansas and Oklahoma was approved by Congress for the purposes of water resource apportionment, pollution abatement, and development and management of water resources. Rights to use and develop the Arkansas river's various sub-basins are apportioned between the two signators; use is limited, however, so that the sub-basin's annual yield is not depleted below a maximum percentage. Depletion in excess of this percentage empowers the Arkansas-Oklahoma Arkansas River Compact Commission to deliver the excess to the injured downstream state. The signators agree to continue individual state efforts to abate pollution and to co-operate in these efforts regarding the Arkansas River basin; they also agree to enter into joint programs for control of sources which pollute the Arkansas River. The Commission consisting of representatives from both states is given broad powers to administer the compact, and each state pays its share of administrative expenses. (Hunter-Florida)
W74-09988

JELLYFISH CONTROL.
Committee on Merchant Marine and Fisheries (U.S. House).
H. R. Report No 91-1192, 91st Cong, 2d Sess, (1970).

Descriptors: *Fish control agents, *Federal project policy, *Legislation, *Jelly fish, *Aquatic algae, *Nuisance algae, Commercial shellfish, Oysters, Aquatic animals, Aquatic life, Aquatic invertebrates, Legal aspects, Cost sharing, Grants, Financing, Projects, Research and development, Research priorities, Testing, Research facilities, Costs, Estuaries, Oceans, Coasts, Shores, Sport fishing, Commercial fishing, Fish management.

Enactment is recommended of a bill which extends the program to provide for the control or elimination of jellyfish and other such pests in the coastal waters of the United States. The need for legislation arises from the fact that thousands of vacationers are precluded from water-recreational opportunities and hundreds of businessmen are deprived of revenues due to the presence of jellyfish and other such pests in United States waters. The jellyfish, or sea nettle, has two life phases, a small nearly microscopic 'plantlife' stage and the familiar umbrella-shaped swimming stage. It is during this second stage that the jellyfish has tenacles containing stinging cells. For the past three years, efforts have been directed towards research in hopes of developing techniques to control or eliminate jellyfish, and the states of Connecticut, Florida, Maryland, Mississippi, New York, Puerto Rico, and Virginia have conducted studies and have shared the costs equally with the federal government. A description of these state studies is included. The bill authorizes the Secretary of the Interior to appropriate funds for the continuation of research and the development and implementation of control techniques. (Ritchie-Florida)
W74-09989

UNION WATER SUPPLY CORP. OF GARCIASVILLE V. VAUGN (PROCEEDINGS ON MOTION TO DISMISS ACTION BY NON-PROFIT CORPORATION ATTACKING CANCELLATION OF ITS WATER PERMIT).
355 F. Supp. 211-217 *S.D. Texas 1972).

Descriptors: *Judicial decisions, *Texas, *Legal aspects, *Water supply, *Water permits, *Rio Grande River, River beds, Riparian waters, Riparian rights, Water law, Water utilization, Water permits, Water rights, Water allocation(Policy), Water distribution(Applied), Domestic water, Water supply developments, Water demand, Water resources development, Water utilization.

The plaintiff, Union Water Supply Corporation, conducts business on a non-profit basis and was organized for the purpose of furnishing and distributing treated domestic water to its subscribers. Plaintiff contends that individuals have a constitutional right to use water from the Rio Grande River for livestock and domestic purposes, and that the defendant unconsititutionally deprived plaintiffs of that right by terminating a temporary water permit. Plaintiffs assert that, by denying water to the individual plaintiffs who joined this action, the defendants are denying a right, privilege, and immunity guaranteed to them by the Fourteenth Amendment. Plaintiffs argue that individuals having a right to domestic and livestock usages of water be allowed to appoint an agent to draw the water from the river, purify it, and disseminate it to households. The District Court held that states have authority to establish for themselves such rules of property as they may deem expendient with respect to the streams of water within their borders both navigable and non-navigable, and the ownership of the lands forming their beds and banks, subject to the authority of Congress over navigation. Thus the termination of the water permit did not violate the plaintiffs' constitutional rights. (Ritchie-Florida)
W74-09990

APPLICATION OF FEDERAL WATER POLLUTION CONTROL ACT REQUIRING NOTICE TO FEDERAL AGENCY OF PROHIBITED DISCHARGE FROM A VESSEL OR FACILITY,
D. B. Levendusky.
17 A.L.R. Fed. 804 (1973).

Descriptors: *Judicial decisions, *Legislation, *Pollutes, *Legal aspects, *Water law, Oily waters, Pollution prevention, Pollution control, Pollution abatement, Pollution sources, Federal government, Administrative agencies, Water quality, Water quality control, Industrial wastes, Vessels, Navigable waters, Facilities, Waste disposal, Waste water, Water pollution sources

Ultimate disposal of wastes, Water conservation, Environmental effects, Water injury, Law enforcement, Water policy.
Identifiers: Non-point sources(Pollution).

One provision of the Federal Water Pollution Control Act requires any person in charge of a vessel or an onshore or offshore facility to notify an appropriate governmental agency of prohibited discharges from such vessel or facility. The Act makes failure to give such notification a crime, and states that notification or information obtained from the notification's exploitation is not to be used against any such person in any criminal case, with certain exceptions. This annotation collects and analyzes the federal cases in which the above described provision of the Act has been construed or applied by the courts. A defendant corporation has been held to be the 'person in charge' to whom the immunity provision was applicable. The courts have noted the legislative intent of (1) insuring the timely discovery of abatable hazards and (2) facilitation and implementation of measures calculated to minimize pollution damages as their basis for so holding. Moreover, without a reporting requirement and the subsequent immunity many discharges of oil would go undetected. The owner-operator is the only source readily available to make timely discovery of oil discharges and call the accident to the attention of those who can prevent its spread and abate it. (Silber-Florida)
W74-09991

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT BY PROVIDING FOR THE REGULATION OF DUMPING IN UNITED STATES WATERS.
House Bill 2493, 93rd Cong, 1st Sess (1973). 5 p.

Descriptors: *Federal government, *Legislation, *Water pollution sources, *Regulation, Wildlife conservation, Aquatic life, Administration, Decision making, Coordination, State governments, Permits, Legal aspects, Water quality, Water conservation, Administrative agencies, Standards, Industrial wastes, Environmental sanitation, Waste water disposal, Sewage disposal, Water resources, Water pollution, Water treatment, Public health, Environmental effects.
Identifiers: Coastal waters, Administrative regulation, Licenses.

This bill would provide protection to marine and wildlife ecology by the regulation of dumping in the ocean, coastal, and other waters of the United States. The Secretary of the Interior and the Administrator of the Environmental Protection Agency will establish standards for the deposit or discharge of all industrial wastes, sludge, and other materials in the country's waters. The purpose of the standards is to insure that no damage to the environment or the ecology will result from such activities. Before any such deposition of materials occurs the party desiring to so discharge has the burden of proving it harmless. The standards will be enforced by any agency, federal or state, that issues a license or permit for such activities in coastal waters. The states are free to develop their own standards as long as they are more stringent than the federal standards, and as long as there are adequate procedures for enforcement. Anyone applying for authorization to dispose of material is required to maintain records to assist in establishing standards. All previous licenses issued by the United States are terminated on the effective date of this bill. (Sperling-Florida)
W74-09992

RULES PERTAINING TO STANDARDS FOR SUBSURFACE SEWAGE AND NON-WATER-CARRIED WASTE DISPOSAL.
Oregon State Dept. of Environmental Quality, Portland.
For primary bibliographic entry see Field 5E.
W74-09993

FLOODING PROBLEMS ASSOCIATED WITH CURRENT HIGH LEVELS OF THE GREAT LAKES.
Michigan Dept. of Natural Resources, Lansing. Water Development Services Div.
For primary bibliographic entry see Field 2H.
W74-09994

POLICY FOR LOCATION OF OFFSHORE PORTS AND OIL REFINERIES IN COASTAL AREAS,
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Industrial Tourist and Community Resources.
For primary bibliographic entry see Field 5G.
W74-09995

WASTE TREATMENT FUND ALLOCATIONS.
U.S. Code Congressional and Administrative News, P.L. 93-243, 87 Stat. 1069, p 5308-5309, 1973.

Descriptors: *United States, *Waste water treatment, *Waste water(Pollution), *Legislation, *Construction costs, *Water pollution treatment, Federal government, Treatment facilities, Sewage disposal, Waste water disposal, Cost allocation, Federal budgets, Water quality, Water demand, Water supply.

This Act will amend the Federal Water Pollution Control Act as to establish the ratio for allocation of treatment works construction grant funds, to insure that grants may be given for other than operable units and to clarify the requirements for development of priorities. The ratio shall now be determined one-half on the basis of table I of the House Public Works Committee Print Numbered 93-28 and one-half on the basis of table II of such print, except that no state shall receive an allotment less than that which is received for the fiscal year ending June 30, 1972, as set forth in table III of such print. The Administrator shall not require any state to consider in the development of priority rankings, any pollution control agreement which may have been entered into between the United States and any other nation, and shall not consider any such agreement in the approval of any such priority ranking. The Act also calls for the Administrator to make a preliminary detailed estimate of any such construction and submit it to Congress at a specified time, and for each state to prepare a cost estimate of each proposed project. (See also W74-09997) (Sutton-Florida)
W74-09996

WASTE TREATMENT FUND ALLOCATIONS--LEGISLATIVE HISTORY.
U.S. Code Congressional and Administrative News, P.L. 93-243, p 5974-5985, 1973.

Descriptors: *Sewage, *Federal Water Pollution Control Act, *Federal project policy, *Cost allocation, *Sewage treatment, *Public utilities, Legislation, Wastes, Federal government, Federal budget, Water pollution, Sewage disposal, Primary treatment, Secondary treatment, Waste treatment, Sewerage, Sewage districts, Water pollution sources, Sewage effluents, Organic wastes, Industrial wastes, Waste disposal.

The Committee on Public Works recommended an amendment to the Federal Water Pollution Control Act. The bill provides the following formula for the allocation of sewerage treatment facility construction grants in 1975. Twenty-five per cent of the total allotted funds are to be allocated among the states in the ratio that the 1972 population of each state bears to the population of all states and seventy-five per cent of the funds shall be allocated on the basis of a needs survey conducted by the Environmental Protection Agency (EPA). The Committee recommended the concededly irrelevant criteria of population because the transition from the 1965 population criterion to the 1972 needs criterion had substantially reduced allocations to certain states in 1972, and had set back their existing programs. Furthermore, the EPA needs survey had several admitted shortcomings. The proposed amendment mandates that the EPA complete a new comprehensive, detailed, and accurate needs survey by June, 1974. The bill seeks to permit a 'phased funding approach' whereby each state may use its annual allocation among as many qualified projects as it wishes, rather than fully fund a few projects each year. (See also W74-09996) (Hunter-Florida)
W74-09997

THE 1972 CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AT SEA,
For primary bibliographic entry see Field 5G.
W74-09998

THE CRIME OF 'POLLUTION': THE ROLE OF FEDERAL WATER POLLUTION CRIMINAL SANCTIONS,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10000

REGULATION OF AIR AND WATER QUALITY IN KANSAS: A CRITICAL LOOK AT LEGISLATIVE AMBIGUITY AND ADMINISTRATIVE DISCRETION,
Kansas Univ., Lawrence. School of Law.
For primary bibliographic entry see Field 5G.
W74-10001

OBSTRUCTIONS IN STREAMS AND DRAINAGE DITCHES.
N.C. Gen. Stat., sec. 77-14 (1969).

Descriptors: *Surface drainage, *Surface waters, *Drainage systems, *North Carolina, *Legislation, Drainage engineering, Land management, Ditches, Enforcement, Drainage programs, Water flow, Water policy, Water law, Drainage practices, Surface runoff, Statues, Dams, Weirs, Penalties(Legal), construction.

Any person, firm, or corporation who shall cause any natural or artificial material to be placed in any creek, stream, river, or natural or artificial drainage ravine or ditch, or in any other outlet which serves to remove water from any land shall be guilty of a misdemeanor. The purpose is the maintenance of natural and normal land drainage. Punishment for offenders is stated. The authorized construction of any dam or weir is excepted from the statutory control. (Proctor-Florida)
W74-10003

A BILL TO AMEND THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972, IN ORDER TO IMPLEMENT THE PROVISIONS OF THE CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AND OTHER MATTER, AND FOR OTHER PURPOSES.
House Bill 5450, 93d Cong, 1st Sess (1973). 5 p.

Descriptors: *Federal government, *Legislation, *Oceans, *Waste disposal, *Waste dumping, Water quality, Water quality control, Permits, Regulation, Standards, Water policy, Administrative agencies, Sea water, Pollution control, Pollution protection, Pollution prevention, Environment, Environmental sanitation, Ecology, Industrial wastes, Agricultural wastes, Marine life, Aquatic life, Water management.

This Bill would amend the Marine Protection, Research and Sanctuaries Act of 1972(Act) to provide that material including, but not limited to, dredged material, solid waste, incinerator residue,

garbage, sewage, sludge, munitions, radiological, biological and chemical warfare agents, radioactive materials, chemicals, laboratory wastes, wrecked or discarded equipment, debris, industrial, municipal, agricultural and other wastes shall not be deposited in the waters or oceans except as authorized by a permit issued subject to the regulations of the Coast Guard. Standards adopted by the Convention on Prevention of Marine Pollution by Dumping of Wastes and Other Matter shall apply to all U.S. vessels as well as those operating and eminating from any other member nation to the Convention while transporting materials to the United States. Permits shall be issued where the Administrator determines that such dumping will not unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities. (Silber-Florida)
W74-10004

ROBINSON V. ROBBINS PETROLEUM CORP. (ACTION FOR WRONGFUL TAKING OF SALT WATER FROM WELL).
501 S.W.2d 865 (Tex. 1973).

Descriptors: *Texas, *Judicial decisions, *Secondary recovery(Oil), *Flooding, *Injection, *Oil wells, Oil, Oil industry, Water rights, Water law, Legal aspects, Saline water, Leases, Oil reservoirs, Drill holes.

The question presented is the right of the surface owner of a tract to recover damages from the operator and owners of a secondary recovery unit for salt water taken from his tract for purposes of waterflooding the entire unit. The petitioner, surface owner, acquired his surface estate subject to the respondent's oil lease. The respondent was using a former oil well located on petitioner's land to produce salt water to be injected and to drive three waterflood units. Under comparable words to those used in the conveyance to petitioner in this case, the Supreme Court of Texas decided that water is an incident of surface ownership, and refused to distinguish between salt and fresh water. There was no proof in the record of the necessity for the waterflood operation to obtain production of oil by the lessee. Mineral owners are entitled to that amount of salt water reasonably necessary to produce oil under the premises, and the petitioner was entitled to recover damages for salt water used to produce oil on lands outside the lease. (Ritchie-Florida)
W74-10005

PRETREATMENT STANDARDS FOR SEWERAGE.
N.J. Stat. Ann., ch. 58: 11-49 to 58: 11-58 (Supp. 1973).

Descriptors: *New Jersey, *Legislation, *Regulation, *Pre-treatment(Water), *Waste water treatment, Water pollution treatment, Sewage treatment, Treatment facilities, Water pollution control, Water pollution sources, Drainage water, Industrial wastes, State governments, Adoption of practices, Decision making, Administration, Water conservation, Waste disposal, Waste dilution, Sewage effluents, Environmental sanitation.
Identifiers: Administrative regulations, Hazardous substances(Pollution).

Certain sewage discharged into treatment plants has damaged the processes in the plant because of the characteristics and potency of particular discharges. This statute seeks to prevent this damage by the adoption of rules and regulations requiring the treatment of certain wastes prior to their discharge into sewerage systems. In the establishing of such rules the New Jersey State Commissioner of Environmental Protection will consider: the treatment capabilities and operating efficiency of the plant or plants to which they apply, and the standards required of the effluent of such plant or plants in conformity with the state's policy concerning the prevention and abatement of pollution. To enforce this act anyone wanting a sewage connection to discharge sewage which consists of industrial waste must make an application providing full information as to the quantity, character, and composition of sewage. The appropriate agency is charged with making or causing to be made an inspection of discharge facilities. The violation of any provision of this statute is subject to a $5,000 fine. (Sperling-Florida)
W74-10006

LYTWYN V. TOWN OF WAWARSING (ACTION FOR DAMAGES RESULTING FROM SURFACE WATER SPILLING ONTO PLAINTIFF'S PROPERTY).
349 N.Y.S.2d 35 (Sup. Ct. 1973).

Descriptors: *Judicial decisions, *Public rights, *Water policy, *Water distribution(Applied), *Legal aspects, *Drainage water, Local governments, Water law, Legislation, New York, Public health, Runoff, Cloudbursts, Water control, Drainage systems, Excess water(Soils).

Plaintiff brought action to recover damages for a loss sustained to their property during a heavy rainstorm. They contended that the loss was occasioned when surface waters collected by a drainage ditch allegedly constructed by defendant, caused water to spill over onto their property, washing out their driveway, lawn and garden. On this appeal, it was contended the court's charge to the jury constituted prejudicial error. The charge was based on the court's interpretation of a statute, which provided that as a condition precedent to the recovery of damages, real or personal, by reason of a culvert being defective, prior written notice, or facts amounting to constructive notice, plus the passage of a reasonable time within which to cure such defect must first be shown. Plaintiff contended that the condition precedent was not applicable where the town has committed an affirmative act which is alleged to be the direct cause of damages sustained. The appeal court held for the plaintiff, stating the affirmative act of creating such a ditch was wrongful even though there was no negligence in its construction or maintenance. With this affirmative act neither prior written nor constructive notice need be shown. The court ordered a new trial to determine whether in fact the defendant had created the ditch, and whether the resulting damage was due to the severe rainstorm or the so-channeled ditch. (Sutton-Florida)
W74-10007

CARLINO V. BARTON (ACTION TO DETERMINE TITLE TO LAND ALONG SHORE AND UNDER LAKE).
349 N.Y.S.2d 535 (Sup. Ct. 1973).

Descriptors: *Lakes, *Judicial decisions, *Adjudication procedure, *Prescriptive rights, *Boundary disputes, Legislation, Water rights, *New York, Boundaries(Property), Lake beds, Legal aspects, Remedies, Ownership of beds, Riparian rights, Water law.

Plaintiffs, landowners, brought action, contending that the description in a deed, which included 'along the shores,' conveyed both the waters to the center of the lake and the land thereunder. The Court held the deed transferred only the land extending to the low water mark of the lake. The Court based its decision on the rule that if a description in a conveyance describes the title as being along dry land such as a bank or shore, then it excludes or reserves title in the non-navigable waters. However, if the boundary is described in terms of the water or along or by the water, the presumption remains that title is carried to the center of the water. A description of the boundary as 'by the shore,' constitutes a clear and express restriction not to convey title to the center of adjacent non-navigable water, but rather a limitation of conveyance to the edge of the waters. Although plaintiffs' claim of title to the center of the lake was rejected, the Court held that the plaintiffs had established their right to enter and use the lake waters by prescription, and defendants who interfered with that right were guilty of a trespass. (Sutton-Florida)
W74-10008

JOINT RESOLUTION TO SET ASIDE REGULATIONS OF THE ENVIRONMENTAL PROTECTION AGENCY UNDER SECTION 206 OF THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.
Senate Joint Resolution 158, 93d Cong, 1st Sess (1973). 4 p.

Descriptors: *Environment, *Federal project policy, *Water resources development, *Water pollution control, *Cost sharing, *Federal budget, Federal government, Legislation, Multiple-purpose projects, Water pollution, Water policy, Project planning, Cost allocation, Decision making, Administration, Coordination.

The regulations pursuant to section 206 are found to be illegal. They discriminate among projects constructed between June 30, 1966 and July 1, 1972, by failing to allocate appropriated funds equally to each qualified project in the ratio that the unpaid balance of the reimbursements due bears to the total unpaid balance to all such projects, thereby preventing many states from receiving any funds to which they are entitled under the section. Any such regulations under section 206 are set aside and are declared to be of no legal effect. To correct this, the Administrator of the Environmental Protection Agency shall submit to Congress within 30 days regulations implementing section 206 so as to effect an equitable allocation of appropriated funds among all qualified projects. Upon submitting the regulations to Congress, the Administrator shall notify each state and within 30 days after such notice each state shall submit a complete list of qualified projects to receive reimbursement. Notwithstanding the requirements of subsection (c) of section 206 applications for assistance under that section may be filed with the Administrator until November 18, 1973. (Sutton-Florida)
W74-10009

OIL POLLUTION REGULATIONS, OIL POLLUTION PROHIBITED ZONES.
Coast Guard, Washington, D.C.
Federal Register, Vol 37, No 103, p 10670, May 26, 1972.

Descriptors: *Legislation, *Regulation, *International law, *Treaties, *Oil pollution, Pollution abatement, Water pollution, Water pollution sources, Water pollution control, Coast guard regulations, Oceans, Oily water, Oil, Oil spills, Foreign waters, Ships, Water law, Legal aspects.
Identifiers: *Administrative regulations.

Federal legislation requires publication in Coast Guard regulations and in Notices to Mariners of extensions of prohibited zones adopted under the Convention for the Prevention of the Pollution of the Sea by Oil. Several such extensions have been effectuated by treaty since the last revision. The following prohibited zones have been added by amendment: The Spanish Zone and the Portuguese Zone, comprised of that portion of the Atlantic Ocean 100 miles off the coast of Spain and Portugal, respectively; the Mediterranean and Adriatic Zones comprising the sea areas within a distance of 100 miles from the nearest land bordering the Mediterranean and Adriatic Seas. Other added zones include the Black Sea and Sea of Azov Zone, the Red Sea Zone, the Kuwait Zone and the Saudi Arabian Zone. This amendment became effective on June 30, 1972. (Ritchie-Florida)
W74-10010

ENVIRONMENTAL STATEMENTS--PROCEDURES FOR PREPARATION.
Office of Saline Water, Washington, D.C.
Federal Register, Vol 37, No 8, p 545, January 13, 1972.

Descriptors: *Adoption of practices, *Administrative decisions, *Administrative agencies, Environment, Comprehensive planning, Management, Project planning, Standards, Federal government, Personnel management, Environmental effects, Feasibility studies, Federal project policy, Projects, Saline water.
Identifiers: *Environmental Impact Statement, *National Environmental Policy Act.

Procedures are issued to enable the Office of Saline Water to fully discharge its responsibilities in compliance with the National Environmental Policy Act. All cases, activities and contractual interests of OSW having significant environmental impact, which have not been previously described or have been inadequately described, shall require an environmental statement. Statements should include needed inputs for specific statements on projects and activities, evaluation of available data, and evaluation of technical comments and recommendations. Responsibilities of the assistant director and staff chiefs and procedures for filing the statements are delineated. At the time it is decided to study a specific project, the environmental aspects of the project also will be studied. Relevant technical information developed in the course of the design studies will be included as a necessary part of the environmental statement, and conversely the plant design will be modified to resolve any environmental problems which may appear. (Barnes-Florida)
W74-10011

PHOSPHATE MANUFACTURING POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10012

NAVIGABLE WATERS OF STATE OF WEST VIRGINIA--WATER QUALITY STANDARDS--PROPOSED RULES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10013

OCEANS OF THE WORLD: THE LAST FRONTIER; AN ANNOTATED INTRODUCTORY BIBLIOGRAPHY ON THE LAW OF THE SEA,
Massachusetts Inst. of Tech., Cambridge. Sea Grant Program.
Report No MITSG 74-17, March 14, 1974. B. Hurd and B. Passero, compilers. 11 p.

Descriptors: *Bibliographies, *Oceans, *International law, *Law of the sea, *International waters, Natural resources, Fish, Mineralogy, Oil, Water pollution, Water pollution sources, Transportation, Water law, Legal aspects, Coasts, Continental shelf, Jurisdiction, Research and development, Marine biology, Grants.
Identifiers: Territorial waters.

As nations' interest in the use of the ocean's resources grows, so do the conflicts resulting from competition for fish, minerals and petroleum, and the problems of pollution, transportation and jurisdiction. In every region of the sea, whether open ocean, continental shelf or coastal zones, legal problems proliferate with the increasing contacts of nations. Thus the international law of the sea has become a complex and sophisticated subject with many problems unresolved and with its full implications as yet unexplored. This annotated bibliography serves as a beginner's guide to the law of the sea. Legal documents have not been included, although some government bodies are listed which are concerned with maritime law. Contents include an introduction to the law of the sea, areas of the ocean, living resources, non-living resources, pollution problems of the sea, regional interests and law of the sea, transportation on the seas and research and ocean law. (Ritchie-Florida)
W74-10055

BIG CYPRESS NATIONAL FRESH WATER RESERVE.
Sen. Bill No 920, 93d Cong, 1st Sess (1973). 6 p.

Descriptors: *Legislation, *Florida, *Watersheds(Basins), *Watershed management(Applied), *Water supply, Water quality, Water requirements, Water law, Water resources, Estuaries, Water resources development, Forest management, Freshwater fisheries, Wetlands, Water shortage, Water sources, Recreation, Land use, Government finance, Interagency cooperation, Ecology, Environmental effects, Conservation.

This bill authorizes the acquisition of the Big Cypress National Fresh Water Reserve in the State of Florida. The unique natural environment of the Big Cypress area of southwestern Florida should be protected from further development which would significantly and adversely affect it ecology. The Big Cypress is a fragile area, and the continued viability of Everglades National Park and certain of the estuarine fisheries of South Florida are directly dependent upon fresh water of adequate quality and volume from the Big Cypress area. In order to effectuate the purpose of this Act, the Secretary of the Interior is authorized to acquire lands, waters and interests therein within the Big Cypress area. However, the boundaries of the area may not encompass more than 522,000 acres of privately owned land. Owners of lands so acquired shall have the right to restricted use of that land for a specified period of time. The Secretary may enter into agreements with Florida or any political subdivision thereof to administer the property acquired persuant to this Act. (Ritchie-Florida)
W74-10056

NEW RIVER AS A POTENTIAL COMPONENT OF THE NATIONAL WILD AND SCENIC RIVERS SYSTEM,
H.R. Bill No 12836, 93d Cong, 2d Sess (1974).

Descriptors: *Wild River Act, *Rivers, *Wild rivers, *Legislation, *Conservation, *Scenery, Aesthetics, Environment, Water policy, Water law, Federal government, Interstate rivers, Virginia, West Virginia, North Carolina, Headwaters, Surface waters, Inland waterways, Natural resources, Resources development, River basin development.
Identifiers: *New River(Va.-W.Va.-N.C.).

This bill would amend the Wild and Scenic Rivers Act of 1968 by designating segments of the New River as a potential component of the National Wild and Scenic Rivers System. The New River is contained within the states of North Carolina, Virginia and West Virginia. The portion to be included is the segment from the headwaters of the North Fork near Tamatuck, North Carolina and the headwaters of the South Fork near Boone, North Carolina to a point on the Main New River near Galax, Virginia. Also to be included is the segment from Sandstone Falls near Sandstone, West Virginia to Hawks Nest State Park, West Virginia. The provisions of the Wild and Scenic Rivers Act shall be applicable to those segments of the New River designated in this Act, except that the time period of such provisions shall be deemed to relate to the date of enactment of this Act insofar as such provisions are applicable to the designated segments. (Ritchie-Florida)
W74-10057

STRATEGIES IN WATER QUALITY CONTROL,
North Carolina Univ., Chapel Hill. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W74-10058

POTABLE WATER--QUALITY GOALS,
For primary bibliographic entry see Field 5G.
W74-10059

WATER POLLUTION PREVENTION AND CONTROL--LIST OF TOXIC POLLUTANTS,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10060

OUTER CONTINENTAL SHELF OFF FLORIDA--POSSIBLE OIL AND GAS LEASING.
Department of the Interior, Washington, D.C.
Federal Register, Vol 38, No 131, p 18390, July 10, 1973.

Descriptors: *Oil industry, *Federal government, *Planning, *Water pollution sources, Offshore platforms, *Florida, Mississippi, Alabama, Oily wastes, Environmental sanitation, Ecology, Economic aspects, Adoption of practices, Administrative agencies, Environmental effects, Engineering structures, Oil, Coastal structures, Project planning, Water quality control.
Identifiers: *Administrative regulations, *Coastal waters, Environmental impact statement(EIS), National Environmental Policy Act(NEPA).

A draft of an environmental impact statement concerning oil and gas leasing under the Outer Continental Shelf Lands Act is being prepared. The tracts lie seaward of Mississippi, Alabama, and Florida. Two of the tracts off the coast of Florida are near a Department of Defense air test and training site. The density of rigs or platforms in this area must be limited. Views of interested parties are requested on the technological, economic and environmental aspects of this proposal. There is a question as to whether there can be efficient development of oil and gas deposits by techniques presently available. It is also desired to calculate how many years after the issuance of a lease will initial production be achieved. A determination is needed of the comparative costs of exploration, development and production with varying densities of oil drilling equipment. Limitations on the size of surface structures are also proposed. (Sperling-Florida)
W74-10061

PROTECTION OF NATIONS WETLANDS--POLICY STATEMENT.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10062

LIABILITY LIMITS FOR SMALL ONSHORE OIL STORAGE FACILITIES--PROPOSED RULES.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 90, p 12339-12340, May 10, 1973.

Descriptors: *Oil, *Oil pollution, *Federal Water Pollution Control Act, *Water pollution sources, *Pollution abatement, Water pollution control, Penalties(Legal), Legislation, Regulation, Environmental effects, Negligence, Oil reservoirs, Oil industry, Water pollution, Federal government, Storage.
Identifiers: Administrative regulations.

The Administrator of the Environmental Protection Agency, pursuant to authority granted him by the Federal Water Pollution Control Act (FWPCA), as amended, has established size classifications and associated liability limits for small onshore oil storage facilities with fixed capacity of 1,000 bbl or less. When a discharge to the waters of the United States occurs from such facilities and when removal of said discharge is performed by the United States government pursuant to the provisions of the FWPCA, the liability of the owner or operator of the facility shall be limited. Four classes of aboveground storage facilities have liability limits ranging from $4,000 to $200,000 depending on capacity of the facility. In addition, there are four classes of belowground storage facilities with liability limits ranging from $5,200 to $260,000, likewise depending upon capacity of the facility. These limitations shall apply in the absence of willful negligence or willful misconduct within the privity and knowledge of the owner or operator. Definitions of various terms as used in this subpart are included within the regulation. (Ritchie-Florida)
W74-10063

SAVING A DYING SEA. THE LONDON CONVENTION ON OCEAN DUMPING,
M. S. Schenker.
Cornell International Law Journal, Vol 7, No 1, p 32-48, Dec 1973. 96 ref.

Descriptors: *International law, *Treaties, *Oceans, *Water pollution, *International waters, Pollutants, Water pollution sources, Legal aspects, Law of the sea, Oil, Oil pollution, Jurisdiction, Marine biology, Natural resources, Environmental effects, Water pollution control, Water quality, Water quality control, Ships, Waste disposal, Permits, Oil spills.
Identifiers: Territorial waters.

The international community has made several attempts, culminating in the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, to control the intentional discharge of objectionable materials into international waters. The problems which have been encountered include those related to the adequacy of the definition of objectionable materials; the suitability of enforcement provisions, including who can enforce an agreement and before what tribunal enforcement will occur; and the adequacy of the available remedies. Apparently spurred by events such as the Torrey Canyon disaster, recent international agreements have continued to emphasize the problems of oil pollution, and have thus continued to ignore the need to define and control the other objectionable materials which are endangering the oceans. Current treaties thus do not provide adequate protection, because only oil pollution is covered and there is no right of action prior to an accident. Another defect in current treaties is that enforcement has been exclusively within the control of the flag state, and has been based on the use of national court systems. (Ritchie-Florida)
W74-10065

SECTION 10 OF THE RIVERS AND HARBORS ACT: THE EMERGENCE OF A NEW PROTECTION FOR TIDAL MARSHES,
J. M. Kramon.
Maryland Law Review, Vol 33, No 3, p 229-264, 1973. 146 ref.

Descriptors: *Rivers and Harbors Act, *Estuaries, *Estuarine environment, *Saline water-freshwater interfaces, *Coastal marshes, Intertidal areas, Inlets(Waterways), Aquatic habitats, Non-structural alternatives, Legislation, Legal aspects, Regulation, Comprehensive planning, Management, Tidal marshes, Wetlands, Marshes, Coastal plains, Coasts, Judicial decisions.
Identifiers: Coastal zone management.

The growing demand for the use of coastal lands and an increasing awareness of the significance and vulnerability of estuarine areas has created a surge of interest in Section 10 of the Rivers and Harbors Act of 1899. Three recent developments have encouraged the use of Section 10 in the preservation of marshlands: judicial recognition of the broad coverage of Section 10; expansion of the scope of inquiry triggered by an application for a Section 10 permit to include factors other than those affecting navigation; and enlargement of the remedies available to a court upon a finding of a violation of Section 10. These developments as they apply to tidal marshes and the need for their protection is also examined. Eay cases suggested the broad definition of the term 'navigable' which is now enabling courts to find marshland areas within the scope of Section 10. An examination of the equitable remedies available to enforce violations of Section 10 is included. (Craig-Florida)
W74-10066

THE PATRIMONIAL SEA,
London School of Economics and Political Science (England).
L. D. M. Nelson.
International and Comparative Law Quarterly, Vol 22, No 4, p 668-686, October 1973. 96 ref.

Descriptors: *Law of the sea, *International waters, *Commercial fishing, *Jurisdiction, United States, Legal aspects, Natural resources, Conservation, Adoption of practices, Governments, Foreign waters, Fish harvest, Wildlife conservation, Water resources development, Water law, Navigation oceans, Continental shelf, Marine geology, Water resources, Administration, Admiralty, International law, Boundary disputes, Coasts.
Identifiers: *Coastal waters, *Coastal zone management.

The patrimonial sea is an economic zone not more than two hundred miles from the base line of the territorial sea. In it there will be freedom of navigation and overflight, but within the zone the coastal state will have an exclusive right to all resources. This law of the sea concept is a result of the conflict of interests between coastal states and nations possessing distant-water fishing fleets. The main marine resources are located in areas adjacent to coastal states. Such resources are not inexhaustible. Proponents of the notion of the patrimonial sea see it as a compromise between the norms of the classical international law of the sea and demands by coastal states. In 1945 the President of the United States issued proclamations providing for the exercise of jurisdiction over the natural resources of the seabed of the continental shelf. Jurisdiction was also provided over coastal fisheries in certain areas of the high seas. Some Latin American countries have claimed sovereignty over the continental shelf itself, and also to the waters above the shelf, known as the 'epicontinental sea'. (Sperling-Florida)
W74-10067

INDIAN LAW--STATE REGULATION--HUNTING AND FISHING RIGHTS.
New York Law Forum, Vol 18, No 2, p 442-450, Fall 1972. 43 ref.

Descriptors: *Indian reservations, *Judicial decisions, *Federal jurisdiction, *Fishing, Administration, Federal reservations, Federal government, Conservation, Public lands, Adoption of practices, State jurisdiction, Hunting, Wildlife, Water utilization, Legislation, Legal aspects, Water law, Water rights, Water resources, Land use, Land management, Land tenure, Regulation.

State regulation of hunting and fishing on Indian Reservations is discussed. In a recent decision a federal district court held that the State of Minnesota could not enforce its game and fish laws against members of a tribe who used the public lands of the Reservation. The court did not sat tribal hunting and fishing were to be exclusively regulated by the tribe, but reserved ultimate jurisdiction for the federal courts. The tribal right to hunt and fish on reservation land free from interference is generally recognized. Treaty rights of the Indian survived subsequent legislation. It is well established principle that a federal treaty is not to be casually abrogated. Legislation passed in 1953 made explicit the preservation of tribal hunting and fishing rights despite the transfer of federal jurisdiction to the states. Courts have used this legislation to establish intent of other legislation passed a half-century before. If justice is to be done to Indian rights it should be done with careful analysis, one that is not prey to a changing national mood. (Sperling-Florida)
W74-10068

ACQUISITION OF INFORMATION FROM OWNERS AND OPERATORS OF POINT SOURCES SUBJECT TO NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10069

TRANSPORTATION FOR DUMPING AND DUMPING OF MATERIAL INTO OCEAN WATERS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10070

STATE CONTINUING PLANNING PROCESS--NOTICE OF INTERIM REGULATIONS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10071

EPA'S RUCKELSHAUS: 'FROM CARELESS INDIFFERENCE TO REMEDIAL ACTION',
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-10072

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM--PROPOSED FORMS AND GUIDELINES ACQUISITION OF INFORMATION FROM OWNERS AND OPERATORS OF POINT SOURCES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10073

WATER BANK PROGRAM--PROPOSED RULES AND REGULATIONS.
Agricultural Stabilization and Conservation Service, Washington, D.C.
Federal Register, Vol 37, No 216, p 23729, November 8, 1972.

Descriptors: *Regulation, *Legislation, *Water *Conservation, *Water conservation, Wate resources, Water resources development, Wate management(Applied), Water law, Water policy Water supply, Water utilization, Planning Watershed management, Federal government, De pendable supply, Farms, Wetlands, Surfac waters, Drainage, Land management.
Identifiers: *Administrative regulations, *Wate bank program.

Notice is given of a proposal to amend the regula tions governing the Water Bank Program a authorized by the Water Bank Act. If the amend ment is adopted a farm will be eligible for par

ticipation in the program if land on the farm is not already covered by a Water Bank Program agreement. In addition the farm must contain specific types of wetlands which are identified in a conservation plan developed in cooperation with the Soil and Water Conservation District in which the farm is located. These types of wetlands which are common to more than one farm are eligible for designation if the farm which controls the potential outlet for drainage of the common wetlands is placed under agreement. No crop shall be harvested from the designated acreage and such acreage shall not be grazed except as may be called for in the conservation plan. The agreement period shall be ten years, and shall become effective on January 1 of the year in which the agreement is approved. The program will be applicable in states and counties designated by the Deputy Administrator of the Agricultural Stabilization and Conservation Service. (Ritchie-Florida)
W74-10074

PUBLIC USE OF WATER RESOURCE DEVELOPMENT PROJECTS--PROPOSED RULES AND REGULATIONS.
Corps of Engineers, Washington, D.C.
Federal Register, Vol 37, No 184, p 19632-19634, September 21, 1972.

Descriptors: *Regulation, *Water resources, *Water resources development, *Federal government, *Federal project policy, Projects, Water policy, Recreation, Permits, Public rights, Public lands, Camping, Swimming, Hunting, Fishing, Natural resources, Multiple purpose projects, Recreation facilities, Social aspects, Water utilization.
Identifiers: *Administrative regulation.

It is the policy of the Secretary of the Army acting through the Chief of Engineers to provide the public with safe and healthful recreational opportunities within the geographical boundaries of all water resource development projects administered by the Chief of Engineers. To this end, the regulations govern the operation of motor vehicles, vessels and aircraft within such areas. Each District Engineer is given authority to regulate swimming, picnicking, camping, hunting, fishing and trapping. Disposal of refuse or litter into any federally owned waters administered by the Chief of Engineers is prohibited. The District Engineer is empowered to regulate fires, fuels, pets, explosives and firearms within the project areas. He is also authorized to sell or dispose of any lost, abandoned or unclaimed personal property that comes into his custody. A permit is required within the project area for any advertisement, structure, special recreational events or occupation of any lands within the project boundaries. Permits for floating structures shall be obtained pursuant to these regulations. Those for non-floating structures, or those placed in navigable waters shall be obtained pursuant to the Rivers and Harbors Act. (Ritchie-Florida)
W74-10075

ESPECIALLY HAZARDOUS CONDITIONS--PROPOSED RULES.
Coast Guard, Washington, D.C.
Federal Register, Vol 38, No 49, p 6902, March 14, 1973.

Descriptors: *Coast Guard regulations, *Boating regulations, *Boating, *Tides, *Tidal effects, Legal aspects, Water circulation, Tidal streams, Tidal waters, Shores, Ocean waves, Ocean currents, Currents(Water), Intertidal areas, Outdoor recreation, Regulation, Boats, Water sports, Recreation, Seaworthiness.
Identifiers: Administrative regulations.

The Coast Guard is considering issuing regulations to provide for the termination of use of recreational vessels during especially hazardous conditions on certain river bars and coastal inlets along the Pacific coastline of Washington and Oregon. Section 13 of the Federal Boat Safety Act of 1971 provides certain conditions under which a Coast Guard boarding officer, if he feels an especially hazardous condition exists, may direct a boat operator to take necessary steps for the safety of those aboard the vessel. The proposed rule will define additional unsafe conditions for recreational boats being used in certain areas along the coastlines of Washington and Oregon. These areas have certain characteristics which make them especially hazardous to navigation. Ebbing tidal currents of rivers clash with the landward moving waves in shallow bar areas, creating a very heavy, turbulent sea. These conditions occur without warning and have produced a high number of drownings. The proposed regulations define a wave height of four feet or greater in a 'Regulated Recreational Boating Area' as an unsafe condition. (Craig-Florida)
W74-10076

NAVIGATION AND NAVIGABLE WATERS--MARINE INFORMATION.
Coast Guard, Washington, D.C.
Federal Register, Vol 37, No 103, p 10669-10670, May 26, 1972.

Descriptors: *Regulation, *Coast Guard regulations, *Navigation, *Navigable waters, Federal government, Administrative agencies, Boating regulations, Ice, Ships.
Identifiers: Navigation obstructions.

The purpose of these amendments is to change the marine information regulations to conform to present practices. The marine information regulations describe the various publications that the Coast Guard uses to provide information for mariners that pertains to the safety of navigation. Since these regulations are descriptions of publications that the Coast Guard uses to inform the public and relate to agency practice, they are exempted from public rule making procedures. The Coast Guard issues information concerning the establishment of aids to maritime navigation and the changes, discontinuances, and deficiencies of aids to maritime navigation maintained and operated by or under the authority of the Coast Guard in documents and marine broadcasts having the general title of 'Notice to Mariners'. This subpart describes those publications and the marine broadcasts. (Ritchie-Florida)
W74-10077

HEAVY WATER--INCREASE IN PRICE.
Atomic Energy Commission, Washington, D.C.
Federal Register, Vol 37, No 49, p 5266, March 11, 1972.

Descriptors: *United States, *Water supply, *Economic aspects, *Nuclear engineering, *Heavy water, Deuterium, Water sources, Water requirements, Administrative agencies, Administration, Adoption of practices, Contract administration, Pricing, Prices.
Identifiers: *Administrative regulations.

The United States Atomic Energy Commission announced an increase in the sale price and in the base charge for heavy water from thirty dollars to thirty-nine dollars per pound. The base charge is the figure used in leasing arrangements by the Commission in applying its annual use-charge rate to the value of the material. In view of the limited United States production capacity, the Commission has not attempted to meet worldwide long-term requirements for this material as it has for enriched uranium. However, to the extent heavy water is available in excess of the needs of Commission sponsored programs, the Commission will contract to supply heavy water for peaceful purposes to domestic and overseas customers on a first-come first-served basis. (Sperling-Florida)
W74-10078

DEFINITION OF NAVIGABLE WATERS OF UNITED STATES--ADMINISTRATIVE PROCEDURE.
Corps of Engineers, Washington, D.C.
Federal Register, Vol 37, No 176, p 18289-18292, Sept. 9, 1972.

Descriptors: *Navigable waters, *Navigation, *Regulation, *Administrative agencies, *Bodies of water, Judicial decisions, Water law, Legal aspects, Water resources, Water resources development, Water policy, Structures, Water utilization, Interstate, Foreign waters, Rivers, Oceans, Continental shelf, Flow, High water mark, Federal government.
Identifiers: Navigability tests.

This amendment includes a more complete discussion and legal analysis of the definition of navigable waters of the United States. That definition is dependent on doctrines established by federal courts, and must therefore periodically be revised to reflect changes in the law. The amendment also reflects the administrative need for a more definitive and explanatory definition as increased and competing demands are made on the nation's water resources. Navigable waters are thus defined as those waters which are presently, or have been in the past, or may be in the future, susceptible for purposes of interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the body of water and is not extinguished by later actions or events which impede or destroy navigable capacity. Determinations are not limited to the natural or original condition of the water body. Navigability may also be found where artificial aids have been or may be used to make the water body more suitable for use in navigation. (Ritchie-Florida)
W74-10079

A CASE STUDY IN INTERSTATE RESOURCE MANAGEMENT: THE CALIFORNIA-NEVADA WATER CONTROVERSY, 1955-1968,
California Univ., Davis. Dept. of History.
W. T. Jackson, and D. J. Pisani.
Available National Technical Information Service as PB-234 015, $4.00 in paper copy, $1.45 in microfiche. California Water Resources Center, Davis. Contribution No 147, May, 1974. 70 p, 4 fig, append. OWRR A-046-CAL(2). UCAL-WRC-W-380.

Descriptors: *Federal-state water rights conflicts, Negotiations, *Interstate compacts, *History, Management, *Water policy, *California, *Nevada, *Interstate commission, Water demands, *Water utilization, Priorities, Alternative water use.
Identifiers: *Lake Tahoe(Calif-Nev), Carson River, Tuckee River, Walker River.

A history is presented of the California-Nevada Interstate Compact Commission from its formation in 1955 through 1971. The commission was responsible for drafting a compact dividing up the surplus water of one interstate lake, Lake Tahoe, and three interstate streams, the Truckee, Carson and Walker rivers. However, largely because of opposition from the federal government, the compact has never taken effect. Federal agencies interested in Lake Tahoe, particularly the Department of the Interior, have blocked any chance for the two states to solve their mutual water problems by imposing a new set of negotiating conditions on the commissioners after a formal compact between the states was adopted. Much of the criticism levelled at the compact commission has been unjustified considering the statutory limitations imposed on the commission's authority when negotiations began. Finally, this report illustrates the continuing conflict over water use priorities in the American West. Throughout negotiations the relative value of water use for recreation was tested against the needs of farmers, power companies and other interest groups. The agree-

ments reached by negotiators reflect the difficulty water use planners have had in reconciling conflicting, and often inconsistent, demand on a limited resource.
W74-10083

THE STATES ENTER THE RURAL WATER PICTURE,
Conset, Inc., Washington, D.C.
M. E. Morgan.
Water Well Journal, Vol 28, No 2, p 34-38, February, 1974.

Descriptors: *Management, *Economics, Rural areas, Federal budget, *New Mexico.
Identifiers: *Rural water systems, *Grant and loan programs, Financial assistance.

The state of New Mexico has one of the oldest and most beneficial grant and loan programs for water supply facilities. The New Mexico project, established as one of National Demonstration Water Project (NDWP) affiliates in 1972, represents NDWP's first statewide effort and is the only affiliate to receive technical assistance, cash grants, and a full-time staff from a state agency. The cut-back in federal aid to rural areas may prompt more states to follow New Mexico's example. Questionnaires sent to all fifty states show that only three states of 20 that have responded are planning to establish grant and loan programs for water supply systems. (Campbell-NWWA)
W74-10106

SEWAGE TREATMENT METHODS IN FINLAND,
National Water Board of Finland, Helsinki. Research Inst.
For primary bibliographic entry see Field 5D.
W74-10162

WATER LAW IN RELATION TO ENVIRONMENTAL QUALITY,
Organization: Colorado State Univ., Fort Collins. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W74-10202

MAN AND HIS ENVIRONMENT,
For primary bibliographic entry see Field 6G.
W74-10242

WATER MANAGEMENT AT ITS BEST.
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 6B.
W74-10271

COMPARATIVE ASPECTS OF COASTAL ZONE MANAGEMENT: BACKGROUND INFORMATION ON THE LAW OF TEXAS AND OTHER STATES IN VIEW OF THE COASTAL ZONE MANAGEMENT ACT OF 1972.
Texas Law Inst. of Coastal and Marine Resources, Houston.
1973, 34 p, 8 append.

Descriptors: *Texas, *Coastal plains, *Coastal areas, *Shore protection, *Shores, *Estuarine environment, Beaches, Coasts, Seashores, Coastal marshes, Water management, Wetlands, Conservation, Management, Land management, Environment.
Identifiers: Coastal zone management.

In 1961, the Texas legislature passed the Reagan-De La Garza Act, declaring a state policy to protect the natural resources in the coastal zone, whether publicly or privately owned. The act was never funded, however, and was repealed on the passage of The Coastal Public Lands Management Act, which concerns only the management of publicly-owned coastal lands. One recommendation is that Texas should vest all coastal management activities in one governmental body, and should provide the following: better overall planning and co-ordination; enforcement of permits and regulations; a system of checks, balances, and veto powers; a review of process outside of the court system; and assurance of participation in, and implementation of the federal coastal zone management program. Efforts of other states in coastal zone management are compared, and three major types of programs are compared: a permit system, an acquisition program to buy up threatened areas, and a system of issuing protective or restrictive orders to limit use. A model approach should employ all three types. (Perrey-Florida)
W74-10272

PROGRESS IN THE RURAL WATER PROGRAMS OF LATIN AMERICA (LOS PROGRAMAS DE ABASTECIMIENTO RURAL DE AQUA DE AMERICA LATINA),
D. Donaldson.
Boletin De La Oficina Sanitaria Panamericana, Vol 76, No 4, p 281-299, April 1974. 2 fig, 6 tab, 18 ref. (English summary).

Descriptors: *Water supply, *Rural areas, *Potable water, Costs, Administration, Financing, *Public health, *South America.
Identifiers: *Latin America.

Rural water supply problems in Latin America have been receiving growing attention. In 1971 about 27 percent of Latin American rural dwellers had potable water, about four times as many as in 1961. However, new goals for 1980 have been established by the Ministers of Health of the Americas. This involves reviewing kinds of rural water systems to be installed, administrative and financial structure of the program, and new approach methods. Past programs have concentrated on the rural villages, have used 'revolving' funds for internal financing, and have tried mass approach concepts. Local participation is necessary to any future success. (Prague-FIRL)
W74-10279

6F. Nonstructural Alternatives

FLOODS FROM SMALL DRAINAGE AREAS IN CALIFORNIA--A COMPILATION OF PEAK DATA, OCTOBER 1958 TO SEPTEMBER 1973,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4A.
W74-09940

FLOOD PLAIN INFORMATION, OHIO RIVER: MONROE COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09965

FLOOD PLAIN INFORMATION, OHIO RIVER: JEFFERSON COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09966

FLOOD PLAIN INFORMATION, MONONGAHELA RIVER: NORTH CHARLEROI, CHARLEROI, SPEERS, DUNLEVY, ALLENPORT, STOCKDALE, ROSCOE, AND ELCO, WASHINGTON COUNTY, PENNSYLVANIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09967

FLOOD PLAIN INFORMATION, OHIO RIVER: BELMONT COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09968

FLOOD PLAIN INFORMATION, OHIO RIVER: WETZEL COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09969

FLOOD PLAIN INFORMATION, OHIO RIVER: MARSHALL COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09970

FLOOD PLAIN INFORMATION, OHIO RIVER: HANCOCK COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09971

FLOOD PLAIN INFORMATION, OHIO RIVER: COLUMBIANA COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09972

A PROPOSED OPEN BEACHES STATUTE FOR FLORIDA,
Miami Univ., Fla. Ocean Law Program.
For primary bibliographic entry see Field 2J.
W74-09977

A BILL TO EXPAND THE NATIONAL FLOOD INSURANCE PROGRAM BY SUBSTANTIALLY INCREASING LIMITS OF COVERAGE AND TOTAL AMOUNT OF INSURANCE AUTHORIZED TO BE OUTSTANDING AND BY REQUIRING KNOWN FLOOD-PRINE COMMUNITIES TO PARTICI PATE IN THE PROGRAM, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W74-09985

FLOODING PROBLEMS ASSOCIATED WITH CURRENT HIGH LEVELS OF THE GREAT LAKES.
Michigan Dept. of Natural Resources, Lansing. Water Development Services Div.
For primary bibliographic entry see Field 2H.
W74-09994

A METHODOLOGY FOR PLANNING LAND USE AND ENGINEERING ALTERNATIVES FOR FLOODPLAIN MANAGEMENT,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4A.
W74-10277

6G. Ecologic Impact Of Water Development

ENVIRONMENTAL MONITORING AT MAJOR U.S. ATOMIC ENERGY COMMISSION CONTRACTOR SITES, CALENDAR YEAR 1972.
Division of Operational Safety (AEC), Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-09840

STATISTICAL TESTS OF LEOPOLD'S SYSTEM FOR QUANTIFYING AESTHETIC FACTORS AMONG RIVERS,
Calgary Univ. (Alberta). Dept. of Geography.
L. Hamill.
Water Resources Research, Vol 10, No 3, p 395-401, June 1974. 2 fig, 5 tab, 7 ref.

Descriptors: *Scenery, *Aesthetics, *Statistical methods, Recreation, Natural resources, Evaluation.
Identifiers: *Environmental impact.

Techniques by Leopold for comparing aesthetic factors among rivers, which include uniqueness ratios and graphic derivations of scale of river character and scale of valley character are evaluated statistically. Summary measures of attractiveness were calculated by adding evaluation numbers or ratings. Leopold's methods were tested by using the Spearman rank correlation coefficient to compare rankings. There was poor correlation between evaluation numbers and uniqueness ratios for physical and water quality factors. Correlation was better for human use and scenic factors. The meaning of additive evaluation numbers is more comprehensible than the meaning of additive uniqueness ratios; the additive uniqueness ratios were concluded to be less efficient. The graphic procedures introduce anomalies in combining two or more sets of factors, and the addition of evaluation numbers was concluded to be more reliable. The addition of evaluation numbers requires less time and effort than the procedures advocated by Leopold and is less subject to errors. (Knapp-USGS)
W74-09913

ENVIRONMENTAL STATEMENTS--PROCEDURES FOR PREPARATION.
Office of Saline Water, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10011

BIG CYPRESS NATIONAL FRESH WATER RESERVE.
For primary bibliographic entry see Field 6E.
W74-10056

NEW RIVER AS A POTENTIAL COMPONENT OF THE NATIONAL WILD AND SCENIC RIVERS SYSTEM,
For primary bibliographic entry see Field 6E.
W74-10057

THE PLANNING OF A CORPS OF ENGINEERS RESERVOIR PROJECT: LAW, ECONOMICS AND POLITICS,
Illinois Univ., Urbana.
For primary bibliographic entry see Field 6B.
W74-10064

SECTION 10 OF THE RIVERS AND HARBORS ACT: THE EMERGENCE OF A NEW PROTECTION FOR TIDAL MARSHES,
For primary bibliographic entry see Field 6E.
W74-10066

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CONSTRUCTION OF MILLSTONE NUCLEAR POWER STATION, UNIT 3, MILLSTONE POINT COMPANY, ET. AL.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-10109

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF RANCHO SECO NUCLEAR GENERATING STATION UNIT 1, SACRAMENTO MUNICIPAL UTILITY DISTRICT.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10110

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2, TENNESSE VALLEY AUTHORITY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-10111

DECOMMISSIONING OF NUCLEAR FACILITIES - A BIBLIOGRAPHY.
Office of Information Services (AEC), Oak Ridge, Tenn.
Available from NTIS, Springfield, Va., as Rept. No. TID-3344; $4.00/copy, $1.45/microfiche. Report No. TID-3344, April 1974. 13 p.

Descriptors: *Bibliographies, *Nuclear energy, Facilities, Equipment, *Nuclear powerplants, *Nuclear reactors, Research and development, Chemical reactions, Fuels, Radioactivity.
Identifiers: *Decommissioning, *Decontamination, Decontaminating agents.

A bibliography contains 108 references which deal with the decommissioning, retirement, or dismantling of various nuclear facilities. The references were selected from Nuclear Science abstracts, and are arranged chronologically by NSA volume and abstract number. (Houser-ORNL)
W74-10119

WATER RESOURCE DEVELOPMENT AND ENVIRONMENT - AN APPROACH TO IMPACT ANALYSIS,
Waterloo Univ. (Ontario). Div. of Environmental Studies.
D. W. Fischer, and G. R. Francis.
International Journal of Environmental Studies, Vol 5, p 299-305, 1974. 40 ref, 3 append.

Descriptors: *Environment, *Environmental effects, *Water resources, *Management, *Administration, Evaluation, Assessment, Analysis.
Identifiers: Impacts identification, Base assessment, Impact assessment.

Environmental impacts of water development projects are becoming a major problem to water managers. Environmentalists have caused such projects to be delayed and even cancelled after considerable time and effort have been expanded. A set of principles to incorporate environmental considerations into water management decisions is suggested. These principles are then applied via consultations and an impact analysis consisting of three parts: identification of environmental units, assessment of the environmental base, and assessment of the environmental impacts. (Houser-ORNL)
W74-10122

WATER LAW IN RELATION TO ENVIRONMENTAL QUALITY,
Organization: Colorado State Univ., Fort Collins. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W74-10202

MAN AND HIS ENVIRONMENT,
Available from NTIS, Springfield, Va 22151 JPRS 59369 Price $3.00 printed copy; $1.45 microfiche. Joint Publications Research Service Report No 59369, June 27, 1973. 45 p, 1 tab. (Translated from Voprosy Filosofii, No 1-2, Moscow, 1973).

Descriptors: *Conferences, *Ecology, *Environment, Social aspects, Political aspects.
Identifiers: *USSR.

In November 1972 the magazine Voprosy Filosofii (USSR) held a roundtable meeting of scholars. The subject of the meeting was 'Man and His Environment.' Consideration of problems of the ecology of man was concentrated on such questions as society and ecology and social aspects of the ecological problems; factors causing the ecological crisis; the relationship of social, cultural, and technical aspects of ecological problems; tasks and ways of humanizing the relationship between man, nature, and society; the relationships between the scientific and technical, the social, and the ecological revolution; ideological and sociopolitical problems of ecology and the features of their resolution under socialism and capitalism; philosophical and cultural aspects--historical precedents and ways of resolving ecological problems; natural scientific principles of the ecological problems; ways of developing modern science and reconciling ecological contradictions; problems of the biological nature of man and factors of man's adaptation of the changing ecological conditions of his existence; and the ideological struggle with problems of man's ecology in the world. (Knapp-USGS)
W74-10242

7. RESOURCES DATA

7A. Network Design

DEVICE FOR AUTOMATIC REMOTE DATA COLLECTION (DARDC),
National Weather Service, Silver Spring, Md. Engineering Div.
L. J. Boezi.
Available from NTIS, Springfield, Va 22151 as COM-73-11417 Price $3.50 printed copy; $1.45 microfiche. National Oceanic and Atmospheric Administration Technical Memorandum NWS-ENG-9, March 1973. 26 p, 3 fig, append.

Descriptors: *Data collections, *Telemetry, *Automation, *Instrumentation, Equipment, Hydrologic data, Meteorological data, Gaging stations, Data transmission, Remote control.

The Device for Automatic Remote Data Collection (DARDC) is a battery-powered responder that can operate at remote unattended sites for periods up to 6 months. When interrogated from a distant station, the DARDC increases its power from a standby state to an operating state, collects data from the hydrological and meteorological instruments connected to it, prepares and transmits a fixed-format, variable-length message to the interrogating station, and then returns itself to a low-power, quiescent state. The DARDC can service from one to four hydrological and meteorological instruments at a time. It establishes an input format for data from hydrological and meteorological instruments and a data transmission code in a form commonly accepted throughout the automatic data processing industry. (Knapp-USGS)
W74-10256

7B. Data Acquition

SURVEY OF REMOTE SENSING APPLICATIONS,
Geological Survey, Reston, Va. Eros Program Office.
M. Deutsch.
Water Well Journal, Vol 28, No 7, p 35-38, July 1974. 5 fig.

Descriptors: *Remote sensing, *Groundwater, *Satellites(Artificial), Infrared radiation, Turbidity, Mapping, Vegetation, Aquifers, Data collections, Hydrologic data.
Identifiers: ERTS.

Data from the first Earth Resources Technology Satellite (ERTS) as well as from NASA and other aircraft, contain much of the information indicative of the distribution of groundwater and the extent of its utilization. Thermal infrared imagery

from aircraft is particularly valuable in studying groundwater discharge to the sea and other surface water bodies. Color infrared photography from aircraft and space is also used to locate areas of potential groundwater development. Anomalies in vegetation, soils, moisture, and their pattern of distribution may be indicative of underlying groundwater conditions. Remote sensing may be used directly or indirectly to identify stream reaches for test holes or production wells. Similarly, location of submarine springs increase effectiveness of groundwater exploration in the coastal zone. (Knapp-USGS)
W74-09899

REGIONAL FLOOD MAPPING FROM SPACE,
National Aeronautics and Space Administration, Greenbelt, Md.
For primary bibliographic entry see Field 7C.
W74-09906

A MODIFIED METHOD OF AERIAL SURVEY OF SHADOWS TO STUDY SNOW COVER (NOVYY VARIANT SPOSOBA AEROFOTOS'YEMKI TENEY DLYA IZUCHENIYA SNEZHNOGO POKROVA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2C.
W74-09930

AIRCRAFT MEASUREMENT OF SEA-WAVE PARAMETERS BY THE RADIO-ENGINEERING METHOD (IZMERENIYE PARAMETROV MORSKOGO VOLNENIYA RADIOTEKHNICHESKIM METODOM S LETATEL'NOGO APPARATA),
Taganrogskii Radiotekhnicheskii Institut (USSR).
A. A. Garnaker'yan, K. L. Afanas'yev, V. T. Lobach, and V. V. Timonov.
Meteorologiya i Gidrologiya, No 12, p 102-108, December 1973. 5 fig, 2 tab, 10 ref.

Descriptors: *Ocean waves, *Radio waves, *Aircraft, *Measurement, *Instrumentation, Specifications, Wavelengths, Height, Equations.
Identifiers: USSR.

A radio instrument operating at a meter wavelength range was designed to measure height of sea waves by the ratio of the incoherent component to the coherent component in the echo. Differences between measurements of sea-wave heights by the new instrument and measurements using the GM-16 wave meter do not exceed 10%. The error of measurement of sea-wave heights by the new instrument depends insignificantly on flight altitude and is practically independent of the aircraft's flight speed and direction. The possibility of measuring the length and direction of sea-wave propagation by the spectral width of the echo was demonstrated experimentally in the meter wavelength range. (Josefson-USGS)
W74-09933

TESTING LIQUID SAMPLES.
Vikers Ltd., Melbourne, (Australia).
Australian Patent 444,506. Issued January, 1974. Official Journal of Patents, Trade Marks and Designs, Vol 44, No 2, p 178, January, 1974.

Descriptors: Equipment, *Patents, *Testing, *Liquids, Australia.
Identifiers: Suction.

An apparatus for use in testing samples of liquids is described. It consists of a multi-outlet chamber and a method for producing suction within the chamber. The liquid is drawn through the chamber inlet into the chamber and along the first fluid path until the liquid reaches the first capillary. The level of liquid in the chamber rises while gas is drawn from the chamber via the second fluid path. The chamber is subsequently emptied of liquid by connecting the third fluid path to connect the first outlet to the suction producing means in the chamber bypassing the portion of relatively high resistance of the first path. (Merritt-FIRL)
W74-10032

MEMBRANE FILTER TECHNIQUE FOR ENUMERATION OF PSEUDOMONAS AERUGINOSA,
Environmental Protection Agency, Narragansett, R. I. Northeastern Water Supply Lab.
M. A. Levin, and V. J. Cabelli.
Appl Microbiol. Vol 24 No 6 p 864-870, 1972. Illus.
Identifiers: Enumeration, *Membrane filter technique, *Pseudomonas-Aeruginosa, Sew water, Sewage, *Bioassay.

A membrane filter procedure for the quantitation of P. aeruginosa (mPA procedure) was developed. Through the use of inhibitors and an elevated incubation temperature, the level of background microbial flora was decreased approximately 10,000-fold. Using P. aeruginosa cells suspended in sea water and held for 24 hr, between 70 and 100% of the cells 'viable' could be recovered by the mPA procedure. Assay variability was found to be significant. The recoveries of P. aeruginosa from surface (fresh and salt) waters, potable waters and sewage by the mPA procedure exceeded those obtainable by current methods. Subsequent to its development and evaluation, the mPA procedure was used at 3 other laboratories for the enumeration of P. aeruginosa in potable and recreational waters and in sewage samples. It was found amenable to routine use and confirmation of typical colonies approached 100%.--Copyright 1973, Biological Abstracts, Inc.
W74-10042

THE EFFECT OF A CHEMICAL METHOD FOR GAUGING DISCHARGE ON THE INVERTEBRATES OF A MOUNTAIN RIVER, (IN FRENCH),
Paul Sabatier Univ., Toulouse (France). Lab. of Hydrobiology.
H. Decamps, and J. M. Elliott.
Ann Limnol. Vol 8, No 1, p 217-222, 1972. (English summary).
Identifiers: Discharge(Water), *Invertebrate drift, Methodology, Mountain rivers, Gaging, *Tracers, *Fluorescein tracers, *Dichromate tracers.

Variations in invertebrate drift were studied during the gauging of discharge in a mountain river (constant rate injection method with dichromate during gauging, and fluorescein in the preliminary trial). There was a slight increase in the numbers in the drift when the fluorescein or dichromate was introduced into the river, but this increase was only statistically significant for total numbers, not for individual taxa.--Copyright 1973, Biological Abstracts, Inc.
W74-10048

RESISTIVITY METHODS IN PROSPECTING FOR GROUND WATER,
Kansas State Univ., Manhattan. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-10100

TURBULENT DIFFUSION IN LIQUID JETS: PART I, MEASUREMENT OF PARTICLE CONCENTRATION BY A LIGHT SCATTERING PROBE,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
For primary bibliographic entry see Field 5B.
W74-10196

APPLICATION OF POLARIZATION MEASUREMENTS IN TRACING TECHNIQUES,
Rhode Island Univ., Kingston.
For primary bibliographic entry see Field 5B.
W74-10203

SOIL WATER CONTENT: MICROWAVE OVEN METHOD,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 2G.
W74-10206

A CAPILLARY TUBE DIFFUSION CELL FOR MEASURING ION DIFFUSION IN AQUEOUS SOLUTIONS,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
For primary bibliographic entry see Field 5A.
W74-10207

AN ECONOMICAL HYDRAULIC LYSIMETER--CONSTRUCTION AND CALIBRATION,
Jawaharlal Nehru Agricultural Univ., Jabalpur (India). Dept. of Soil Science and Agricultural Chemistry.
For primary bibliographic entry see Field 2G.
W74-10238

AN ERTS VIEW OF ALASKA--REGIONAL ANALYSIS OF EARTH AND WATER RESOURCES BASED ON SATELLITE IMAGERY,
Cold Regions Research and Engineering Lab., Hanover, N.H.
D. M. Anderson, W. K. Crowder, L. W. Gatto, R. K. Haugen, and T. L. Marlar.
Available from NTIS Springfield, Va 22151 as AD-765 442 Price $4.25 printed copy; $1.45 microfiche Technical Report 241, June 1973. 48 p, 36 fig, 3 tab, 36 ref. NASA Contract S-70253-AG.

Descriptors: *Remote sensing, *Alaska, *Satellites(Artificial), Water circulation, Glaciers, *Sedimentation, *Mapping, Geomorphology, Surveys, Data collections, Photogrammetry, Aerial photography, Water resources, Regional analysis, *Permafrost.
Identifiers: *Cook Inlet(Alas), *ERTS satellite.

Satellite imagery was used for synoptic surveys of the distribution and environmental interrelationships of permafrost terrain and of coastal sedimentation and related processes in Cook Inlet, Alaska. Earth Resources Technology Satellite multispectral scanner (MSS) imagery was the primary data source for this investigation. Aerial underflight imagery and ground observations of selected sites were secondary data sources. Emphasis has been placed on evaluating the feasibility of mapping permafrost terrain from textural and tonal patterns related to surficial geology and vegetation. A mosaic of a 153,400-sq km area in north-central Alaska was prepared at a scale of 1:1 million. Seven surficial geology, 8 vegetative cover and 4 permafrost terrain units were defined and delineated. Many geomorphic features were also recognized: thaw lakes, stream drainage patterns, glacial moraines, cirques, abandoned glacial valleys and volcanic cones. The distribution of sediments and regional circulation patterns can be monitored using satellite imagery. (Knapp-USGS)
W74-10251

REFLECTANCE OF VEGETATION, SOIL, AND WATER,
Agricultural Research Service, Weslaco, Tex.
C. L. Wiegand.
Available from NTIS, Springfield, Va 22151 as N74-11165 Price $3.00 printed copy; $1.45 microfiche. Report to NASA, Goddard Space Flight Center, November 1973. 7 p, 1 fig, 1 tab, ERTS-1 GSFC ID AG 339.

Descriptors: *Remote sensing, *Satellites(Artificial), *Vegetation, Soils, Soil radiation, Aerial photography, Data collection, *Texas, Seasonal, Chlorophyll, Crops, Leaves, Canopy, *Reflectance.
Identifiers: *ERTS satellite, Hidalgo County(Tex.

The seasonal changes in reflectance of various soils and of various crops grown in Hidalgo County, Texas, are being studied using ERTS-1, ground, and aircraft spectral data. Discrimination of specific crop and soil conditions is being attempted; chlorophyll content of plant leaves is being correlated with reflectance in the visible channels, and comparisons are being made between ERTS data and predictions from analytical models describing interaction of light with plant canopies. (Knapp-USGS)
W74-10252

PROBLEM OF MEASUREMENT OF SOIL MOISTURE POTENTIAL BY THE CRYOSCOPIC METHOD (K VOPROSU OB IZMERENII POTENTSIALA POCHVENNOY VLAGI KRIOSKOPICHESKIM METODOM),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 2G.
W74-10265

POSSIBILITY OF MAPPING ICE CONDITIONS ON LARGE LAKES FROM SATELLITE IMAGERY (VOZMOZHNOST' KARTIROVANIYA LEDOVOY OBSTANOVKI NA KRUPNYKH OZERAKH PO SNIMKAM S ISKUSSTVENNYKH SPUTNIKOV ZEMLI),
Gosudarstvennyi Gidrologicheski Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2C.
W74-10266

RECORDING WATER USE BY MEANS OF DIGITAL EQUIPMENT,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
L. F. Payne, and H. A. Schreiber.
Agronomy Journal, Vol 64, No 1, p 83-84, January-February, 1972. 1 fig.

Descriptors: *Water utilization, *Measurement, *Hydroponics, Data collections, *Data storage and retrieval, *Water loss, Instrumention, Automation, Data processing.

A device made of digital components is described that automatically (1) senses a discrete loss of water in individual hydroponic cultures: (2) stores this information as identifying numbers in an 8 2-digit word memory; and (3) displays this information on an electric typewriter at 1-minute intervals. As many as 16 readings a day can be obtained in a greenhouse, if the ratio of leaf area to water surface area is high enough. This equipment, then, gives a sensitive measurement of water use related to climatic, genetic, or physiologic treatments. (Skogerboe-Colorado State)
W74-10332

7C. Evaluation, Processing and Publication

APPLICATION OF THE LUNR INVENTORY SYSTEM FOR WATER RESOURCES PLANNING AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN,
Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
For primary bibliographic entry see Field 6B.
W74-09807

MODELS AND COMPUTER CODES FOR EVALUATING ENVIRONMENTAL RADIATION DOSES,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5B.
W74-09824

THE TRANSMISSIVITY ITERATIVE PROGRAMS ON THE PDP-9 COMPUTER - A MAN-MACHINE INTERACTIVE SYSTEM,
Battelle-Pacific Northwest Labs., Richland, Wash. Mathematics Dept.
For primary bibliographic entry see Field 2F.
W74-09825

A DATA ACQUISITION SYSTEM FOR TRANSIENT POROUS MEDIA EXPERIMENTS IN A SECTOR TANK,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 2F.
W74-09887

SURVEY OF REMOTE SENSING APPLICATIONS,
Geological Survey, Reston, Va. Eros Program Office.
For primary bibliographic entry see Field 7B.
W74-09899

REGIONAL FLOOD MAPPING FROM SPACE,
National Aeronautics and Space Administration, Greenbelt, Md.
A. Rango, and V. V. Salomonson.
Water Resources Research, Vol 10, No 3, p 473-484, June 1974. 11 fig, 12 ref.

Descriptors: *Mapping, *Floods, *Regional flood, *Satellites(Artificial), *Remote sensing, Flood data, Infrared radiation, Aerial photography, Surveys.
Identifiers: *ERTS.

The Earth Resources Technology Satellite (ERTS 1), launched on July 23, 1972, was used to monitor the extent of inundation of regional floods. The inundated areas exhibit sharply reduced near-infrared reflections caused by standing surface water, excessive soil moisture, and stressed vegetation, which persist up to 10-12 days after the flood peak. The amount of area affected by flooding over regions encompassing many thousands of square kilometers can be mapped definitively at 1:250,000 scale from ERTS 1 imagery in times much shorter than those required by ground-based or aircraft snurveys. The ERTS 1 imagery also permits easy extension of flood mapping to areas not normally covered by more familiar survey methods. In addition to the detection of flood events, ERTS 1 can be used to map flood susceptibility indicators on the floodplain for purposes of delineating flood-prone areas. (Knapp-USGS)
W74-09906

EXPECTED RANGE AND ADJUSTED RANGE OF HYDROLOGIC SEQUENCES,
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W74-09908

FLOODS FROM SMALL DRAINAGE AREAS IN CALIFORNIA--A COMPILATION OF PEAK DATA, OCTOBER 1958 TO SEPTEMBER 1973,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4A.
W74-09940

HYDROLOGIC DATA OF THE NEPONSET AND WEYMOUTH RIVER BASINS, MASSACHUSETTS,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 4A.
W74-09945

SIMULATION OF ALLUVIAL FAN DEPOSITION BY A RANDOM WALK MODEL,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 2F.
W74-10054

TEST WELL YIELDS DATA ON HYDROGEOLOGIC PROPERTIES OF SUBSURFACE MATERIALS,
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 4B.
W74-10095

DETERMINING FRACTURE PRESSURE GRADIENTS FROM WELL LOGS,
Schlumberger Well Services, Houston, Tex.
For primary bibliographic entry see Field 8B.
W74-10099

POTENTIAL USES FOR BOREHOLE LOGS IN MINERAL EXPLORATION,
Sproule (J. C.) and Associates Ltd., Calgary (Alberta).
For primary bibliographic entry see Field 8G.
W74-10105

WATER ATLAS OF THE UNITED STATES,
J. J. Geraghty, D. W. Miller, F. Van der Leeden, and F. L. Troise.
Water Information Center, Inc., Port Washington, New York, 1973. 244 p.

Descriptors: Groundwater, Water supply, Water utilization, Water quality, *Water resources, *Water conservation, Water law, Water pollution, *Maps.

A comprehensive, visual guide to the water situation in the United States is presented. This edition contains 122 maps covering subjects related to water resources, water use, water pollution and quality, water conservation, water law and water-based recreation. Maps are also presented for Alaska and Hawaii. Some maps were acquired from governmental and private sources, while others were prepared by the authors. All maps have been modified and drawn on a similar base to facilitate comparisons. A text description accompanies each map and contains facts and statistics that are not shown on the map. All time-dependent information is identified by date. (Staplin-NWWA)
W74-10107

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING THE MILLSTONE NUCLEAR POWER STATION, WATERFORD, CONNECTICUT, AUGUST 29 AND SEPTEMBER 11, 1969.
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 5A.
W74-10120

GROUND BASED OBSERVATIONS SUPPORTING THE SHIPPINGPORT PENNSYLVANIA, AERIAL RADIATION SURVEY OF FEBRUARY 1973.
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 5A.
W74-10121

PERCOL USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resource Dept.
For primary bibliographic entry see Field 5B.
W74-10123

WATER RESOURCES OF THE KOMI ASSR AND PROSPECTS OF THEIR USE (VODNYYE RESURSY KOMI ASSR I PERSPECKTIVY IKH ISPOL'ZOVANIYA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 4A.
W74-10230

ESTIMATED RAINFALL FOR DRAINAGE CALCULATIONS IN THE UNITED KINGDOM,
Transport and Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 2B.
W74-10241

AN ERTS VIEW OF ALASKA--REGIONAL ANALYSIS OF EARTH AND WATER RESOURCES BASED ON SATELLITE IMAGERY,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 7B.
W74-10251

DEVICE FOR AUTOMATIC REMOTE DATA COLLECTION (DARDC),
National Weather Service, Silver Spring, Md. Engineering Div.
For primary bibliographic entry see Field 7A.
W74-10256

WATER RESOURCES DATA FOR TEXAS, 1973: PART 1. SURFACE-WATER RECORDS.
Geological Survey, Austin, Tex.
Data Report, 1974. 639 p, 1 fig, 1 tab, 3 ref.

Descriptors: *Surface waters, *Streamflow, *Texas, Basic data collections, *Data collections, *Hydrologic data, Stage-discharge relations, Discharge(Water), Rainfall.

Surface-water records for the 1973 water year for Texas, including records of streamflow or reservoir storage at gaging stations, partial-record stations, and miscellaneous sites, are presented. Records for a few pertinent gaging stations in bordering States also are included. The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. For a lake or reservoir station, capacity tables giving the contents for any stage are prepared from stage-area relation curves defined by surveys. The description of the gaging station gives the location, drainage area, period of record, type and history of gages, average discharge, extremes of discharge or contents, and general remarks. During the 1973 water year, annual runoff over the State was deficient in the west, near normal in the north and central, and excessive in the south and east. (Knapp-USGS)
W74-10268

OPTIMAL DESIGN OF PRESTRESSED CONCRETE PIPES USING LINEAR PROGRAMMING,
Organization S. V. Regional Coll. of Engineering and Technology, Surat (India).
For primary bibliographic entry see Field 8A.
W74-10319

8. ENGINEERING WORKS

8A. Structures

DRAINAGE AND EROSION CONTROL FACILITIES, FIELD PERFORMANCE INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. L. Grace, Jr., C. C. Calhoun, Jr., and D. N. Brown.
Available from NTIS, Springfield, Va. 22151 AD-762 537 Price $3.00 printed copy; $1.45 microfiche. Army Engineer Waterways Experiment Station Miscellaneous Paper H-73-6, June 1973. 105 p, 36 fig, 1 tab, 32 ref.

Descriptors: *Drainage systems, *Military reservations, *Erosion control, *Drainage engineering, Drainage practices, Sewers, Filters, Pipes, Outlets, Storm drains.

The drainage and erosion control facilities of 54 military installations were studied to evaluate performance of surface and subsurface drainage systems, erosion control measures, and conditions of buried conduits and associated facilities. The use of poorly graded filter materials permits infiltration of fines into subdrains and is one of the major causes of ineffective subsurface drainage facilities. Filters should be designed relative to base course material rather than the subgrade. Perforated pipe is considered more practical than porous pipe. Manholes and flushing risers should be provided along subdrains at intervals of 1000 feet or less. Screens should be provided over all subdrain outfalls to prevent animals from nesting and debris from entering the pipe. Outfall ditches should be sited, inspected periodically, and cleaned as needed to prevent the possibility of reverse flow into the subdrain system. The location, size, and depth of subdrains are extremely vital in elimination of frost heave. Most flexible and rigid conduits installed during the period 1940-1960 appear to be in good to excellent condition. Improved techniques of collecting, removing, and disposing of industrial wastes from storm water need to be developed and automatic warning devices should be installed to indicate unsafe concentrations in storm-drainage systems. (Knapp-USGS)
W74-09948

SANITARY LANDFILL,
Army Construction Engineering Research Lab., Champaign, Ill.
For primary bibliographic entry see Field 5E.
W74-10018

SHEAR-RESISTANT FLEXIBLE PIPE JUNCTION FOR SEWERAGE AND DRAINAGE.
Hoechst Australia Ltd., Melbourne.
Australian Patent 439,581. Issued September 6, 1973. Australia, Official Journal of Patents, Trade Marks and Designs, Vol 43, No 33, p 3557, September 6, 1973.

Descriptors: *Sewers, Conduits, Engineering structures, *Plastic, *Pipes, Equipment, *Patents.
Identifiers: Collar sections.

A shear-resistant flexible pipe junction for sewerage and drainage is described. It consists of a pipe joint collar fitting of substantially flexible thermoplastic material either rotationally cast, or made by some other process, in the form of cylindrical collar sections. Two adjoining plain pipes abut the collar sections. The collar includes two or more axially-spaced internal annular spaces, one in each section to accommodate a resilient sealing ring for sealing the pipes. There is an external circumferential groove extending between the internal spaces. The flexibility of the groove permits a pair of adjoining pipes to undergo relative angular movement without pipe or seal breakage. (Merritt-FIRL)
W74-10019

DRAINAGE GRATING,
P. D. Basev, K. G. Ipatova, and I. S. Shirior.
Soviet Patent 374,424. Issued April 25, 1973. Soviet Inventions Illustrated, Section III, Mechanical and General, U(47), p 3, December 27, 1973.

Descriptors: Storm water, *Storm drains, Intakes, *Urban drainage, Sewers, Municipal wastes, *Patents, Water pollution control.
Identifiers: *Grating.

A grating of half-cylindrical form designed to retain litter and general rubbish being carried along by storm water and sewage is described. The concept is similar to a radio tuning-coil, in that a sector composed of plates can be rotated inside the main grating. The closed section can therefore be altered so that it always faces the direction of flow thus retaining the rubbish, while the water passes through the open section. The unit consists of a flat framework with semi-circular plates forming a grating. Interposed between the plates are further plate sectors connected to an operating rod. The rubbish carried along by the rain or sewage flow is separated from the waterby rotating the plates to face the water flow. Stops are provided to prevent overtravel of the swinging sector. (Merritt-FIRL)
W74-10026

FILTRATION APPARATUS AND METHOD.
Holliday (L. B.) and Co. Ltd., Sydney (Australia).
Australian Patent 445, 653. Issued May 5, 1969. Official Journal of Patents, Trade Marks and Designs, Vol 44, No 7, p 669, February 28, 1974.

Descriptors: *Patents, *Filtration, *Separation techniques, Liquids, Pressure, Equipment, Flow, Pressure, *Waste water treatment.
Identifiers: Solids.

Separation of a solid medium from aliquid medium is accomplished by a cylindrical inner wall for the housing, a cylindrical core with a longitudinal bore, and an axially moveable core which makes up a filtration apparatus. A pressure chamber is provided by a flexible tube diaphragm within the housing, located within the annular cavity. A deformable lip is joined to the body portion but is free from the core, adapted to come into sealing contact with a co-operating portion of the housing in the operative position of the core. A liquid-solid inlet is defined; and a third portion of the housing defines a fluid inlet leading into the pressure chamber between the inner wall and the outside of the diaphragm. A fourth and final portion of the housing defines a fluid outlet leading from the pressure chamber to outside the housing, with means for exerting a fluid pressure on the outside of the diaphragm via the fluid inlet, pressure being releasable via the fluid outlet. (Prague-FIRL)
W74-10034

DESIGNING AN EFFICIENT WELL CAN BE EASY,
Universal Oil Products, St. Paul, Minn. Johnson Div.
J. L. Mogg.
Water and Waste Engineering, Vol 2, No 1, p A-1 - A-2, January, 1974, 1 fig.

Descriptors: Water supply, Wells, *Design standards, *Performance, *Design.
Identifiers: *Well efficiency.

Steps to be followed in designing a large capacity well (once the yield is known) are outlined. These steps consist of: 1) Selecting casing size, based on yield; 2) Selecting screen length as about 70% of thickness of aquifer and position screen in the center of the aquifer or toward the bottom portion; 3) Choosing a gravel pack that is approximately five times as coarse as the gradation of the aquifer material; 4) Specifying a screen slot opening that will retain 90% of the gravel pack; 5) Selecting a screen diameter that will transmit the yield of the well at a well screen entrance velocity of 0.1 ft/sec. (Often the screen diameter is smaller than the casing); 6) Selecting the hole diameter opposite where the screen is to be positioned by selecting a thickness of the gravel pack between three and eight in; 7) Specifying that the gravel pack particles be uniform (uniformity coefficient to be 2.5 or less) clean, well rounded, and consisting mostly of silica particles (95%). (Martino-NWWA)
W74-10104

OPTIMAL DESIGN OF PRESTRESSED CONCRETE PIPES USING LINEAR PROGRAMMING,
Organization S. V. Regional Coll. of Engineering and Technology, Surat (India).
M. C. Thakkar, and J. K. S. Rao.
Computers and Structures, Vol 4, No 2, p 373-380, March 1974. 3 fig, 2 tab, 17 ref.

Descriptors: *Structural design, *Linear programming, *Concrete pipes, Water supply, Pipelines, Lakes, Optimization, Constraints, Costs, Systems analysis, Mathematical models.
Identifiers: *India(Veeranam Lake).

Non cylinder composite type prestressed concrete pipes are being used extensively in India for high pressure water supply lines. These pipes are being designed presently by the conventional 'analysis' type structural design process where, for an assumed geometric property, either design behavior at various loading stages is checked or pressure capacity is worked out. Contrary to this, a 'synthesis' type process of design is presented, which provides several alternatives from which to select the optimum. Specifically, design behavior at various loading stages and pressures is considered as an input in the design process ('synthesis'), and geometric properties are generated as an output. The optimal design solution is found using linear programming; constraints are derived for safe behavior at various loading stages. The objective function is the cost of materials; labor costs, laying costs, costs of mortar cover and secondary reinforcements are assumed as being constant for all alternatives. An illustrative design example, considering Veeranam Lake--Madras 230 km pipe line, shows substantial economy over conventionally-designed pipes. The optimal solution satisfies the behavior under transient loadings, earth loads, and possible load combinations. (Bell-Cornell)
W74-10319

8B. Hydraulics

HYDROGRAPHY OF THE CHESAPEAKE AND DELAWARE CANAL,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 4A.
W74-09944

METHOD FOR CONTROLLING FLOW OF AQUEOUS FLUIDS IN SUBTERRANEAN FORMATIONS,
Dow Chemical Co., Midland, Mich.
For primary bibliographic entry see Field 8G.
W74-10029

THE RIGHT CHEMICALS ARE ABLE TO RESTORE OR INCREASE WELL YIELD, PART II,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 8G.
W74-10085

PROCESS FOR THE DETECTION OF HYDROGEN SULFIDE IN DRILL BIT CUTTING,
Cities Services Oil Co., Tulsa, Okla.
For primary bibliographic entry see Field 8G.
W74-10086

WELLBORE EFFECTS IN INJECTION WELL TESTING,
Marathon Oil Co., Denver, Colo.
For primary bibliographic entry see Field 8G.
W74-10091

PRESSURE BUILDUP AND FLOW TESTS IN WELLS,
Shell Oil Co., New York.
C. S. Matthews, and D. G. Russell.
Storm Printing Corp., Dallas, Texas, 1967. 167 p.

Descriptors: Reservoirs, *Hydraulic engineering, Hydraulics, Potential flow, Flow measurement, Pressure.
Identifiers: Reservoir engineering, *Pressure buildup, *Flow tests.

A comprehensive study of the creation and analysis of transient pressure responses in wells is presented. The basic principles are reviewed, and the applicability and limitations of the various techniques are critically discussed and illustrated. Chapters consider the following areas of reservoir engineering: (1) mathematical basis for pressure analysis methods, (2) pressure buildup analysis, (3) determination of average reservoir pressure, (4) pressure drawdown analysis, (5) multiple-rate flow test analysis, (6) analysis of well interface tests, (7) pressure analysis in injection wells, (8) drillstem test pressure analysis, (9) effect of reservoir heterogeneities on pressure behavior, and, (10) practical aspects of pressure analysis. The concluding chapter reviews the state of the art in reservoir engineering, defines current problems and points to areas of further research. (Campbell-NWWA)
W74-10092

EXPERIMENTAL INVESTIGATION OF HYDRAULIC FRACTURING THROUGH PERFORATIONS,
Halliburton Services, Duncan, Okla.
A. A. Daneshy.
Journal of Petroleum Technology, p 1201-1206, October, 1973. 9 fig, 1 tab, 3 ref.

Descriptors: *Fractures, *Fracture permeability.
Identifiers: *Hydraulic fractures, *Perforations, Perforation arrangement, Breakdown pressure.

Experimental results are presented to show the effect of perforation geometry on hydraulic fracturing. The experimental results are based on tests conducted on five samples for each perforation arrangement. The experiments indicated that hydraulic fracturing through perforations increases breakdown pressure as the number of perforations decreases. Helicol perforations were superior to line perforations in establishing communication with hydraulic fractures. The pressure of casing and perforations seem to have little influence on the direction of fracturing. (Staplin-NWWA)
W74-10093

WATER IS WHERE YOU FIND IT,
Universal Oil Products, St. Paul, Minn. Johnson Div.
R. L. Scheurs.
The Johnson Drillers Journal, September-October, 1973, p 3-5, 6 fig.

Descriptors: Topography, Saturation, *Aquifer characteristics, *Alluvial fans, *Fracture permeability, *Glacial aquifers, Saline water.
Identifiers: Aquifer thickness, Saturation thickness.

A series of six illustrations with accompanying explanations are given to show why some wells are successful while nearby wells are considered a failure because of inadequate yield or poor water quality. These illustrations represent groundwater conditions related to: (1) the effect of topography on saturation and aquifer thickness; (2) salt water areas; (3) alluvial fan deposits; (4) low yielding fractured rocks; and (5) glaciated deposits. (Campbell-NWWA)
W74-10094

TEST WELL YIELDS DATA ON HYDROGEOLOGIC PROPERTIES OF SUBSURFACE MATERIALS,
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 4B.
W74-10095

INERTIAL AND SLIP EFFECTS IN STEADY-STATE RADIAL GAS FLOW THROUGH POROUS MEDIA,
Alberta Univ., Edmonton.
For primary bibliographic entry see Field 8G.
W74-10096

DETERMINING FRACTURE PRESSURE GRADIENTS FROM WELL LOGS,
Schlumberger Well Services, Houston, Tex.
R. A. Anderson, D. S. Ingram, and A. M. Zanier.
Journal of Petroleum Technology, November, 1973. p 1259-1268, 12 fig, 2 tab, 19 ref, 1 append.

Descriptors: *Borehole geophysics, Fractures, Pore pressure, Porosity, Overburden.
Identifiers: *Fracture pressure gradient, Gulf Coast, *Sonic log, *Density log, Well logs, Biot.

An expression for computing fracture pressure gradient in Gulf Coast sands as a function of overburden pressure, pore pressure, porosity, Poisson's ratio, and well depth is developed using Biot's stress/strain relationships. Using field data, an empirical relationship is established between Poisson's ratio and the shaliness of the sand as derived from well logs. This relationship enables one to use sonic and density logs to determine pore pressure and overburden stress, which are needed to calculate the fracture pressure gradient. (Campbell-NWWA)
W74-10099

HERE'S HOW TO FIND PERMEABILITY FROM DRAWDOWN AT A CONSTANT RATE,
British Petroleum Co., Ltd., London (England).
F. H. Mann.
The Oil and Gas Journal, September 18, 1968. p 148-149, 1 fig, 2 ref.

Descriptors: *Permeability, *Drawdown, *Flow resistance.
Identifiers: *Skin-free pressure, Pressure decline, *Constant pressure decline.

Assuming ideal conditions, a direct method is discussed to find formation flow resistance and permeability from a single measurement of drawdown. To apply this method it must be assumed that the well has flowed at a constant rate from an initially static condition, that fluid of a small and constant compressibility is being produced from an infinite, homogeneous and isotropic reservoir, and that the bottom-hole drawdown contains no excess due to skin effect. The method offers three main advantages over others in that it uses the exact formula for pressure decline, it requires no iteration, and it avoids estimating a radius of drainage. Examples are given to illustrate the method. (Martino-NWWA)
W74-10101

DESIGNING AN EFFICIENT WELL CAN BE EASY,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 8A.
W74-10104

VACUUM SEWER SYSTEMS FOR NORTHERN APPLICATIONS,
Project Planning Associates Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 5D.
W74-10174

VACUUM SEWAGE TRANSPORT AND TREATMENT IN RURAL AREAS IN DENMARK,
Electrolux A/S (Denmark).
For primary bibliographic entry see Field 5D.
W74-10175

TURBULENT DIFFUSION IN LIQUID JETS: FINAL REPORT,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
For primary bibliographic entry see Field 5B.
W74-10195

TURBULENT DIFFUSION IN LIQUID JETS: PART I, MEASUREMENT OF PARTICLE CONCENTRATION BY A LIGHT SCATTERING PROBE,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
For primary bibliographic entry see Field 5B.
W74-10196

NEGATIVELY BUOYANT JETS IN A CROSS FLOW,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
For primary bibliographic entry see Field 5B.
W74-10200

VARIATION OF REGIME COEFFICIENTS IN PAKISTAN CANALS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
K. Mahmood.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers Vol 100, No WW2, Paper 10514, p 85-104, May 1974. 9 fig, 3 tab, 16 ref, append.

Descriptors: *Sediment transport, *Open channel flow, *Alluvial channels, Hydraulics, Flow resistance, Canals, Irrigation canals, Regime.
Identifiers: *Pakistan.

The three degrees-of-freedom of hydraulic regime in a straight alluvial canal can be represented by Froude number F; width-depth ratios, and energy gradient S. They can also be represented by the coefficients in regime equations. The physical interpretation of these regime coefficients was investigated to explain Lacey's regime equations. Data on Pakistan Canals are analyzed in the framework of regime theory and it is shown that: (1) The width of a stable channel section is related to the maximum operational discharge; and (2) the regime coefficients a1 and a4 are related as the bed material load and resistance functions of sand-bed channels. In their day-to-day operation, the sand-bed alluvial canals have only one degree-of-freedom that is related to their bed material load. (Knapp-USGS)
W74-10219

GUIDELINES FOR THE DESIGN OF SUBSURFACE DRAINAGE SYSTEMS FOR HIGHWAY STRUCTURAL SECTIONS,
Cedergren/KOA, Sacramento, Calif.
For primary bibliographic entry see Field 4C.
W74-10235

ENERGY DISSIPATOR FOR SANTA PAULA CREEK, SANTA CLARA RIVER, CALIFORNIA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
J. H. Ables, Jr.
Sponsored by U.S. Army Engineer District, Los Angeles, Technical Report H-73-11, June 1973. 66 p, 17 photo, 20 pl, 2 ref.

Descriptors: *Energy dissipation, *Hydraulic models, *Open channel flow, *California, Design.
Identifiers: *Santa Paula Creek(Calif.), *Santa Clara River(Calif.).

The Santa Paula energy dissipator at the confluence of Santa Paula Creek and Santa Clara River will reduce velocities and dissipate energy from flood flows. Since flood flows could occur in the Santa Paula Channel with little or no tailwater effect from flow in the Santa Clara River, an energy dissipator that will function satisfactorily regardless of tailwater elevation was desirable. Thus, a deisign with impact blocks placed throughout the structure to gradually reduce velocities and induce backwater in the channel was used. Tests revealed that flow conditions in the high-velocity channel and curve immediately upstream of the energy dissipator were satisfactory, while conditions in the original design energy dissipator were unsatisfactory. Riprap requirements at the dissipator outlet and Santa Clara River were determined. (WES)
W74-10314

LOCK AND DAM NO. 8, ARKANSAS RIVER NAVIGATION PROJECT; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
J. J. Franco, and C. D. McKellar, Jr.
Sponsored by U.S. Army Engineer District, Little Rock, Technical Report H-73-10, May 1973. 98 p, 2 tab, 42 pl.

Descriptors: *Hydraulic models, *Locks, Inland waterways, *Arkansas, Design.
Identifiers: *Arkansas River Navigation Project.

Lock and Dam No. 8 will consist of a 110- by 600-ft lock and a 1120-ft-long, gated, nonnavigable dam. A movable-bed model reproducing 11.0 miles of the Arkansas River, with a horizontal scale of 1:120 and a vertical scale of 1:80, was used to determine: (a) the suitability of the proposed site for the lock and dam structure; (b) adequacy of proposed regulating works in the reach upstream and downstream of the structures and modifications required to provide adequate channel dimensions and satisfactory navigation conditions with minimum maintenance; and (c) relative effectiveness of various sizes of initially dredged channels in a section of river similar to the section reproduced in the model downstream of the dam. (WES)
W74-10315

OUTLET WORKS FOR SITE 16, PAPILLION CREEK AND TRIBUTARIES, NEBRASKA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
B. P. Fletcher.
Sponsored by U.S. Army Engineer District, Omaha,. Technical Report H-73-17, October 1973. 50 p, 4 photo, 23 pl.

Descriptors: *Hydraulic models, *Outlet works, *Nebraska, Flood control, Earth dams.
Identifiers: *Papillion Creek(Neb).

The recommended project plan for flood control on Papillion Creek (Nebraska) at the Site 16 reservoir includes the construction of an earth dam, an uncontrolled spillway, and an uncontrolled outlet works consisting of an intake structure and conduit through the dam. A model study was considered warranted since the Site 16 outlet works included structural features that had not been studied in the previous model studies, namely, low-level intakes, an access shaft, a change in both conduit grade and alignment, and an orifice-control device located at the conduit entrance. Results were as follows: (a) Intermingling and instability of the nappes as flow passed through the low-level intakes were eliminated. (b) The 6-ft-diam access shaft was reduced to 3 ft permitting the release of air entrained within the flow that created slug flow within the conduit when the conduit flowed full upstream of the access shaft. (c) A dimensionless equation was developed for calculating the discharge capacity of roof constrictions to establish orifice control at a conduit entrance. (d) Equations were developed for calculating the discharge characteristics associated with weir and orifice control at the intake of similar outlet works. (WES)
W74-10316

GRAYS HARBOR ESTUARY, WASHINGTON; REPORT 1, VERIFICATION AND BASE TESTS. APPENDIX A: SUPPLEMENTARY BASE TEST DATA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
N. J. Brogdon, Jr., and G. M. Fisackerly.
Sponsored by U.S. Army Engineer District, Seattle. Technical Report H-72-2, May 1973. 330 p, 4 tab, 309 pl.

Descriptors: *Estuaries, *Hydraulic models, *Washington, Salinity, Dispersion.
Identifiers: *Chehalis River(Wash), *Grays Harbor(Wash).

The existing comprehensive fixed-bed model of the Grays Harbor estuary was used to obtain current velocity, salinity, and flushing and dispersion data for model conditions of mean tide and low and high freshwater inflow. These data will supplement model base condition data obtained earlier in the model study with a mean freshwater inflow. A general dye dispersion study, consisting of dyes released at six individual locations, was conducted with model conditions of mean tide and low freshwater inflow. These data can be utilized to predict the general flushing and/or dispersion characteristics of a possible future pollutant source that had its origin in one of the six general areas. (See also W72-14727) (WES)
W74-10317

A MATHEMATICAL MODEL FOR THE ANALYSIS OF RIVER DIVERSIONS,
Hydraulics Reasearch Station, Wallingford(England).
W. R. White.
The Institution of Civil Engineers, Proceedings, Part 2, Research and Theory, Vol 55, p 371-389, June 1973. 15 fig, 2 tab, 9 ref.

Descriptors: *Simulation analysis, Rivers, *Diversion, *Design, *Dams, Operations, Optimum development plans, Flow water levels, Structures, Construction, Planning, Systems analysis, Equations, *Mathematical models.
Identifiers: *Argentina(Rio Limay), El Chocon Dam(Argentina), Field data, Closure schemes.

River diversion is a critical stage in the construction of a permanent dam. The consulting engineer needs to determine the optimum design for the diversion works at an early stage of the project and, later on, the contractor must know whether a successful closure is possible at the prevailing flows and within his available resources. Presented is a mathematical model which seeks to answer these questions; the model simulates the diversion operation and adapts step by step calculations to the use of a computer. The alternatives are a physical model or step by step calculation using a slide rule. The performance of the model is compared with prototype data obtained during the diversion of the Rio Limay at El Chocon (Argentina), and alternative diversion schemes illustrate the speed and versatility of the new modeling technique. (Bell-Cornell)
W74-10320

8C. Hydraulic Machinery

ELECTRICAL ENERGY AND ITS ENVIRONMENTAL IMPACT - PROGRESS REPORT, DECEMBER 31, 1972.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5C.
W74-09836

DISTRIBUTION AND RELEASE OF TRITIUM IN HIGH-TEMPERATURE GAS-COOLED REACTORS AS A FUNCTION OF DESIGN, OPERATIONAL, AND MATERIAL PARAMETERS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-09838

HYDRAULIC SEWER PIPE LINE CLEANER,
Conco Inc., Mendota, Ill.
R. C. Latall.
Canadian Patent 939,459. Issued January 8, 1974. Canadian Patents, Vol. 102, No 2, p 76, January 8, 1974.

Descriptors: *Pipes, Pipelines, Pumping, *Sewers, Municipal wastes, *Patents, Waste water treatment.
Identifiers: *Pipe cleaner.

A skid-mounted jet-propelled, hydraulic, pipeline cleaner is described which is activated from a stationary high pressure water pumping unit to which it is connected by a flexible hose. The cleaner includes: a novel skid arrangement of extreme rigidity and a selectively positionable waterjet capable of assuming either a propelling position or a tool flushing position. A jet propulsion system was designed so that the jet discharges directly into the pipeline void and does not impinge against any portion of the pipeline cleaner as a whole so that no retarding influence is offered to the free forward motion of the cleaner. (Merritt-FIRL)
W74-10023

PRESSURE BUILDUP AND FLOW TESTS IN WELLS,
Shell Oil Co., New York.
For primary bibliographic entry see Field 8B.
W74-10092

PUMPING WATER BY THE AIR-LIFT METHOD HAS PRACTICAL APPLICATIONS,
Universal Oil Products, St. Paul, Minn. Johnson Div.
D. Kill.
The Johnson Drillers Journal, p 1-3, November-December, 1973. 2 fig, 2 tab.

Descriptors: *Pumping testing, Pumping, Equipment, Pumps, Hydraulic machinery, *Water wells.
Identifiers: *Air-lift pumping.

Pumping water from wells by the air-lift method is described as an extremely important tool for test pumping, developing and maintenance cleaning of water wells of all sizes. The practicability of the air-lift for testing and developing wells stems from the following advantages: easily improvised and installed; readily converted from a pump to an effective development tool; not subject to damage when sand is pumped with water; power unit does not have to be set up for driving pump; many rotary rigs are equipped with high capacity air compressors; trailers or truck-mounted compressors are readily available to cable tool operators. The basic principles of pumping by the air-lift method are described and an example of pump testing a well using air-lift methods is presented. (Martino-NWWA)
W74-10097

WATER SYSTEM OPERATOR NEEDS BASIC INFORMATION TO KEEP PUMPS WORKING, PART I.
Universal Oil Products, St. Paul, Minn.
The Johnson Drillers Journal, p 1-3, 13, March-April 1974. 4 fig, 1 tab.

Descriptors: *Pumps, Design, Pumping.
Identifiers: Inlet head, *Suction characteristics, Pump design, *Pump operation, Submersible pump.

Knowledge of how each well pump and the well in which it is installed function is fundamental to the proper operation of a water well system. Operating characteristics of well pumps are discussed in detail to give the water system operator basic information needed to keep pumps in the proper working order. Design criteria, such as well diameter and pump size, are discussed in terms of optimum performance, long service life, and reasonable cost. The suction characteristics of pumps are discussed in detail and related to factors such as atmospheric pressure, vapor pressure, frictional losses and inlet head. (Campbell-NWWA)
W74-10103

VISCOSITY ACTUATED PHASE SEPARATING (VAPS), FOR OIL-WATER SEPARATIONS,
Union Carbide Corp., Bound Brook, N.J. Chemicals and Plastics.
For primary bibliographic entry see Field 5G.
W74-10231

8D. Soil Mechanics

OUTLET WORKS FOR SITE 16, PAPILLION CREEK AND TRIBUTARIES, NEBRASKA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-10316

BULK DENSITY OF A FRAGIPAN SOIL IN NATURAL AND DISTURBED PROFILES,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
D. D. Fritton, and G. W. Olson.
Soil Science Society of America Proceedings, Vol 36, No 4, p 686-689, July-August, 1972. 3 tab, 7 ref.

Descriptors: *Soil physics, *Soil density, Soil compaction, Soil horizons, *Soil profiles, Soil properties, Soil structure, Soil texture, Soil types, Soils, Silts, Loam.
Identifiers: *Fragipan soils, *Erie channery silt loam.

Bulk density of horizons and layers in soil profiles at two locations (for natural soil and soil above pipelines and a tileline) showed that modification of the Erie channery silt loam fragipan by mechanical disturbance alone results in re-establishing dense soil layers in less than 11 years. Buried topsoil, however, was much less dense after 12 years. (Skogerboe-Colorado State)
W74-10342

8E. Rock Mechanics and Geology

SAVANNAH RIVER LABORATORY PROGRESS REPORT-LONG-RANGE WASTE MANAGEMENT.
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
For primary bibliographic entry see Field 5E.
W74-09881

EXPLOSIVE FRACTURING IN HEAVY OIL SANDSTONE,
Bureau of Mines, Bartlesville, Okla. Energy Research Center.
J. S. Miller.
Petroleum Engineering, Vol 44, No 13, December, 1972. p 84, 86, 7 fig, 1 ref.

Descriptors: *Explosions, Sandstones, *Oil reservoirs, *Fractures(Geologic), Viscosity, *Kansas.
Identifiers: High-viscosity oil, TNT, Well stimulation, Downhole fracturing.

Engineers of the U.S. Bureau of Mines recently performed an explosive fracturing experiment, using 9000 lb of pelletized TNT, in three wells on the Leap lease 30 miles east of Coffeyville, Kansas. The experiment was performed in the Bartlesville Sandstone formation to create fragmentation and paths of communication between wells so that heavy high-viscosity oil can be produced by an experimental heat-solvent application. Tests indicate that from 50,000 to 65,000 bbl of oil per acre are contained in the sand, but the oil is so viscous that significant amounts cannot be produced by conventional methods. At the time printing, the site had been cleared by blasting, but the sand had not yet been cleaned out of the three wells. After cleanout, tanks and equipment will be installed to inject and circulate a hot solvent into and among the three-well zone. Results of heating, dilution, and penetration of the solvent should indicate the degree of recovery. (Staplin-NWWA)
W74-10088

PREDICTING THERMAL CONDUCTIVITIES OF FORMATIONS FROM OTHER KNOWN PROPERTIES,
California Univ., Berkeley.
J. Anand, W. H. Somerton, and E. Gomaa.
Society of Petroleum Engineers Journal, Vol 13, No 5, p 267-273, October, 1973. 9 fig, 1 tab, 12 ref.

Descriptors: *Thermal conductivity, *Borehole geophysics, Porosity, Permeability, Density, Sandstones.
Identifiers: *Thermal conductivity prediction.

Measuring the thermal properties of rocks and rock-fluid systems is difficult and time consuming, and the results from such measurements are of limited value unless complete descriptions of the rock and fluids are given. A need exists for a method of predicting thermal behavior from other more easily measurable properties. Presented are correlations developed for predicting the thermal conductivity of consolidated sandstone from a knowledge of density, porosity, permeability, and formation resistivity factor. Values for all these properties are available from well logs or core analysis data. Also obtained were correlations for estimating the thermal conductivity of liquid-saturated sandstones from a knowledge of the conductivities of dry sandstones and the saturating liquid and properties of the sandstone. The thermal conductivity of most rocks decreases with increasing temperature and a method of estimating this effect is presented. The effect of pressure on conductivities is generally small, but may be predicted from a knowledge of the bulk compressibility of the rock. (Campbell-NWWA)
W74-10089

BUREAU OF MINES ENVIRONMENTAL ACTION PROGRAMS FOR NORTHEASTERN PENNSYLVANIA--REFUSE BANK REMOVAL; SUBSIDENCE MONITORING,
MITRE Corp., McLean, Va.
For primary bibliographic entry see Field 5A.
W74-10270

8G. Materials

METHOD FOR CONTROLLING FLOW OF AQUEOUS FLUIDS IN SUBTERRANEAN FORMATIONS,
Dow Chemical Co., Midland, Mich.
W. G. Routson.
Canadian Patent 944,548. Issued April 2, 1974. Patents/Brevets, Vol 102, No 14, p 1156, April 2, 1974.

Descriptors: *Flow control, *Patents, Colloids, Subsurface flow, Inorganic compounds, Resistance, Porous media, *Canada, Polyelectrolytes.

The formation of colloidal, water-insoluble, inorganic compounds in the presence of high molecular weight organic polyelectrolytes in dilute aqueous solution provides aqueous compositions having improved resistance to flow through porous subterranean formations. The use of these compositions provides a method for diminishing or shutting off water production in oil wells, for controlling the mobility of aqueous fluids in zones of higher permeability in such formations and for plugging subsurface leaks as in earthen dams. This method provides a useful adjunct in the control of theif zones in oil well drilling and in secondary recovery of petroleum by water flooding techniques. (Merritt-FIRL)
W74-10029

THE RIGHT CHEMICALS ARE ABLE TO RESTORE OR INCREASE WELL YIELD, PART II,
Universal Oil Products, St. Paul, Minn. Johnson Div.
D. C. Schafer.
The Johnson Drillers Journal, p 4-6, March-April, 1974. 1 tab.

Descriptors: *Incrustation, *Chlorination, Chlorine, Phosphorus compounds, Detergents, Surfactants.
Identifiers: Hypochlorites, Sodium polyphosphates, Chemical removal.

The various chemical compounds available to remove well incrustations, and to chlorinate water are discussed in terms of their effectiveness. Several of the hypochlorite products such as calcium, lithium-, and sodium hypochlorite are as effective as chlorine gas for sanatizing water, and less dangerous in handling. The glassy and crystalline varieties of sodium polyphosphates are excellent detergents to be used in dispersing silt and clay particles that reside in sand and gravel aquifers. It is suggested that surfactants or wetting compounds be used in conjunction with dispersing agents and acids to enhance removal of incrustations. (Staplin-NWWA)
W74-10085

PROCESS FOR THE DETECTION OF HYDROGEN SULFIDE IN DRILL BIT CUTTING,
Cities Services Oil Co., Tulsa, Okla.
W. S. Fallgatter.
U.S. Patent 3,702,235, November 7, 1972. 3 p, 3 tab, 3 ref.

Descriptors: Drilling fluids, Drilling samples, Chemical reactions, Mud, Sampling, *Hydrogen sulfide, Filtration, *Deposition, Rotary drilling.
Identifiers: *Drill bit cuttings, Sulphide deposits, Oil-base muds.

A process is described wherein drill bit cuttings are analyzed for hydrogen sulfide content, in order to determine the presence of a hydrogen sulfide deposit. The cuttings are ground in the presence of a hydroxonium ion, subsequently vacuum filtered, and rinsed with distilled water in order to provide a filtrate. The filtrate is introduced into a flask containing a zinc powder, utilized in conjunction with hydrogen chloride to provide a sweep of gas of hydrogen, in order to evolve hydrogen sulfide which is then qualitatively and quantitatively detected. The process allows testing of cuttings of water or oil-base muds to yield accurate determinations of amount of hydrogen sulfide originally present in the drill bit cuttings. (Campbell-NWWA)
W74-10086

PREDICTING THERMAL CONDUCTIVITIES OF FORMATIONS FROM OTHER KNOWN PROPERTIES,
California Univ., Berkeley.
For primary bibliographic entry see Field 8E.
W74-10089

NEW DRILLING-RESEARCH TOOL SHOWS WHAT HAPPENS DOWN HOLE,
Esso Production Research Co., Houston, Tex.
F. H. Deily, W. H. Dareing, G. H. Paff, J. E. Ortloff, and R. D. Lynn.
The Oil and Gas Journal, p 55-65, January 8, 1968. 12 fig, 2 tab.

Descriptors: *Drilling equipment, *Telemetry, Measurement.
Identifiers: *Drill-string, *Bit motion, *Annular pressure, Drill-string forces.

A tool designed to measure and record drill-string forces and motions is described, and data obtained from several field wells are analysed. The tool records axial load, torque, bending, and the rates of change of these values, as well as pressure inside and outside the drill string. Data from the test wells showed that bit weights continually varied from 25 to 50% of the mean weight. At times, maximum bit load reached over 3.5 times the mean load. Bit motions were generally small, but peak-to-peak amplitudes of up to one inch were recorded during rough drilling. Pressure variations in the pipe generally showed four pulses per pump stroke. Annular pressure variations were quite small, but variations of 600 psi were noted. Frequencies of weight, torque, and bending showed evidence of rock-bit tooth action, cone action, rotation, and pump pulsation. (Martino-NWWA)
W74-10090

WELLBORE EFFECTS IN INJECTION WELL TESTING,
Marathon Oil Co., Denver, Colo.
R. C. Earlougher, K. M. Kersch, and H. J. Ramey.
Journal of Petroleum Technology, November, 1973. p 1244-1250, 9 fig, 9 ref.

Descriptors: *Injection, Geologic formations, Evaluation, *Testing procedures, Injection wells.
Identifiers: *Wellbore storage, *Injectivity tests, *Pressure falloff tests.

The effect is discussed of wellbore storage on pressure falloff tests used to investigate formation properties. Data are given showing that, under certain circumstances, wellbore effects can make test interpretation for formation characteristics practically impossible. Field data illustrating the problem, an explanation of these data, suggestions for injection well testing and test analysis are included. The analysis technique is illustrated. (Martino-NWWA)
W74-10091

EXPERIMENTAL INVESTIGATION OF HYDRAULIC FRACTURING THROUGH PERFORATIONS,
Halliburton Services, Duncan, Okla.
For primary bibliographic entry see Field 8B.
W74-10093

INERTIAL AND SLIP EFFECTS IN STEADY-STATE RADIAL GAS FLOW THROUGH POROUS MEDIA,
Alberta Univ., Edmonton.
P. M. Dranchuk, and A. R. Piplapure.
Journal of Petroleum Technology, p 1155-1156, October, 1973, 10 ref.

Descriptors: *Permeability, *Steady flow, Testing procedures, *Porous media.
Identifiers: *Radial gas flow, *Absolute permeability, Linear gas flow, Gas flow tests.

The relationship describing steady horizontal radial gas flow through porous media does not take into account any slip at the gas-solid interface. It has been shown in both the linear and radial gas flow tests that neither slip nor inertial effects should be neglected when using flow tests to evaluate rock properties. The expression for steady horizontal radial gas flow may be modified to allow for slip, and integrated for linear flow. A similar integration for radial flow yields a non-linear ordinary differential equation with no known solution. However, assuming that the ratio of the Klinkenberg slip coefficient to the pressure is sufficiently small, the relation can be reduced to a soluable form. The reduced equation can then be solved for the true absolute permeability. (Staplin-NWWA)
W74-10096

CORROSION BASICS. PT. 7. NEW LIGHT SHED ON CATHODIC PROTECTION,
J. D. Palmer.
Canadian Chemical Processing, Vol 56, No 10, p 60-62, October, 1972.

Descriptors: *Cathodic protection, *Corrosion control, Oxidation, Reduction, *Chemical reactions, Anodes, Cathodes, Electric currents.
Identifiers: *Protective coatings, Buried pipelines, Surface tanks, Wharfs, Pilings.

Cathodic protection, in combination with protective coatings, is the primary means of controlling corrosion in buried and submerged pipelines. It is also used to control corrosion of submerged surface tanks, wharfs, and pilings. The theory involved in cathodic protection is discussed. Each corrosion reaction can be separated into an anodic and a cathodic reaction or, respectively, an oxidation and a reduction reaction. Corrosion takes pl ace at the anode or more negative part of the cell, and no corrosion takes place at the cathode or more positive part of the cell. Current is discharged from the anode in the form of metal ions going into solution, and is accepted at the cathode in the form of positive ions from the environment being reduced at the cathode surface. (Staplin-NWWA)
W74-10102

POTENTIAL USES FOR BOREHOLE LOGS IN MINERAL EXPLORATION,
Sproule (J. C.) and Associates Ltd., Calgary (Alberta).
W. B. Anderson.
Canadian Mining and Metallurgical Bulletin, Vol 67, No 743, p 164-168, March, 1974. 9 fig, 1 tab, 1 ref.

Descriptors: *Wells, *Logging(Recording), *Borehole geophysics, Electric well logging, Radioactive well logging, Subsurface investigations, Exploration, Mining, Oil industry, Groundwater, Computers, Data processing.
Identifiers: Sonic logs, Natural gamma logs, Neutron porosity.

The oil industry uses borehole measurements of electrical characteristics, radioactivity, density and other physical properties to determine quantitatively rock and fluid properties of significance. These same borehole measurements are available to the mining (including groundwater) industry for

quantitative calculations. Standard measuring devices which are lowered into the borehole on electrical cables are available to measure resistivity, natural gamma radiation, density, velocity of sound and hydrogen index (neutron porosity). To demonstrate the use of the technique, typical rock and fluid mixtures encountered in petroleum and potash exploration are shown. Some rock mixtures encountered in coal and metallic mineral exploration are next examined to determine the resolution available and an attempt is made to predict the performance of the logs in the various rock mixtures. (Staplin-NWWA)
W74-10105

FAILURE OF 307 BASIN TRANSFER LINE AND RESULTANT GROUND CONTAMINATION,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 5B.
W74-10127

8H. Rapid Excavation

PROJECT RIO BLANCO: PROMPT ECOLOGICAL EFFECTS RESULTING FROM GROUND MOTION,
Geonuclear Corp., Las Vegas, Nev.
For primary bibliographic entry see Field 5C.
W74-09831

PREDICTION OF GROUND MOTION CHARACTERISTICS OF UNDERGROUND NUCLEAR DETONATIONS.
Environmental Research Corp., Las Vegas, Nev.
Available from NTIS, Springfield, Va 22151 NVO-1163-239 Price $6.00 printed copy; $1.45 microfiche. Environmental Research Corporation Contract Report NVO-1163-239, March 1974. 186 p, 75 fig, 19 tab, 26 ref, 4 append. USAEC Contract AT(29-2)-1163.

Descriptors: *Nuclear explosions, *Seismic studies, Nuclear engineering, Seismic waves, Datqa collections, Construction, Bibliographies.
Identifiers: *Ground motion(Seismic).

Information required for predicting ground motion (peak amplitudes and spectral composition) for underground nuclear detonations is compiled in a manual. This comprehensive report contains information necessary for a technical understanding of the theoretical and empirical bases of ground motion predictions as well as for making ground motion predictions for an arbitrary nuclear detonation. The prediction procedures developed in the report are based on 13 years of experience and are designed to produce information of the type and in the format typically required by a structural engineer performing an evaluation of structural response and damage potential. Extensive references are provided to enable the interested reader to obtain additional information on specific topics of interest. (Knapp-USGS)
W74-09947

EXPLOSIVE FRACTURING IN HEAVY OIL SANDSTONE,
Bureau of Mines, Bartlesville, Okla. Energy Research Center.
For primary bibliographic entry see Field 8E.
W74-10088

EXPLOSIONS FOR CANAL CONSTRUCTION,
I. Potapov.
Available from NTIS, Springfield, Va 22151 JPRS 59042 Price $3.00 printed copy; $1.45 microfiche. Joint Publications Research Service Report No 59042, May 17, 1973. 4 p, (Translated from Nauka i Zhizn', No 1, Moscow, 1973.)

Descriptors: *Explosives, *Excavation, *Canal construction, Explosions.
Identifiers: USSR.

A new method of constructing drainage canals with explosives uses one long horizontal charge instead of a series of separate vertical cylindrical charges. For this purpose a strong elastic polyethylene hose is filled with explosive. The hose is connected to the lower part of the blade of a tractor-mounted trencher. As the tractor moves the blade plows and soil and the charged hose is laid in the soil behind it. When the soil is frozen the hoses are not required and the powder is poured directly into the trench cut by a trenching machine. (Knapp-USGS)
W74-10243

8I. Fisheries Engineering

EVALUATION OF THE EFFECTIVENESS OF STURGEON REPRODUCTION IN THE UPPER POOL OF THE VOLGOGRAD HYDRO DEVELOPMENT SYSTEM BASED ON RESULTS OF COUNTING DOWNSTREAM-MIGRATING JUVENILES IN THE LOWER POOL, (IN RUSSIAN),
G. A. Batychkov.
Tr Volgogr Nauchno-Issled Inst Ozern Rechn Rybn Khoz. 6, p 79-87. 1972.
Identifiers: Counting, Hydro power plants, Juveniles, Migrating fish, Pools, *Reproduction, *Sturgeon, *USSR(Volgograd).

In 1965-1969 about 1500 juvenile sturgeon were caught downstream from the Volgograd hydro development (USSR). The length of the downstream-migrant juveniles ranged from 16-90 cm, predominantly 20-55 cm. The age varied from less than 1 yr (fingerlings) to 11 yr, up to 90% of the juveniles migrated downstream at an age of 2-4 yr and fingerlings comprised about 0.5% in 1965-1967. After damming the Volga near Saratov downstream migration of the fingerlings was not observed, the number of 2-yr-olds decreased and the relative number of 5-yr-old fishes increased. The sturgeon spawners transplanted to the Volgograd reservoir after construction of the Saratov hydro development began to accumulate in its lower pool, where an extremely low effectiveness of reproduction was observed. In 1965-1969 about 700,000 uneven-aged juveniles annually migrated downstream from the reservoir, which is about half that observed during the preceding 5 yr. In all, 11 million juveniles of 15 generations were counted, the most abundant being the 1959 generation from the large school of spawners that had time to reach the spawning grounds before damming the Volga at Volograd. The calculation of the number of spawners is shown.--Copyright 1973, Biological Abstracts, Inc.
W74-09926

TEXTBOOK OF FISH CULTURE. BREEDING AND CULTIVATION OF FISH,
For primary bibliographic entry see Field 2I.
W74-10045

COOK INLET SOCKEYE SALMON INVESTIGATIONS,
Alaska Dept. of Fish and Game, Juneau.
S. Pennoyer, R. Paulus, and A. S. Davis.
Available from NTIS, Springfield, Va 22151, COM-73-10823, Price $3.00 printed copy; $1.45 microfiche. Completion Report NOAA-73042713 for period July 1965-June 1971, March 1972. 166 p, 14 fig, 21 tab, 21 append.

Descriptors: *Alaska, *Salmon, *Fisheries, Data collections, Commercial fish, Commercial fishing, Fish management.
Identifiers: *Cook Inlet(Alaska).

The Sockeye Salmon Investigations project was initiated with an overall objective of collecting biological data from the Cook Inlet (Alaska) sockeye salmon run that would be useful in establishment of more scientific management of the run. These objectives included escapement estimation where visual methods were impractical, determination of smolt outmigration levels, optimum escapement goals, stock identification, revision of catch statistics, and other related projects. Sonar salmon counters, for adult enumeration, were developed and partially tested under this program. Downstream migrant sampling gear was developed that is suitable for use on glacial rivers with high water velocities and severe debris problems. Plans for future smolt programs are discussed. Stock identification studies utilized freshwater circuli counts as the distinguishing feature. Age and sex composition of the run were established. Catch statistics were compiled to reflect catch by period rather than by fishing week. (Knapp-USGS)
W74-10267

PARASITES OF YOUNG GRASS CARP CTENOPHARYNGODON IDELLA (VALENCIENNES) AT FISH FARMS OF THE VOLGA DELTA, (IN RUSSIAN),
For primary bibliographic entry see Field 2I.
W74-10313

9. MANPOWER, GRANTS AND FACILITIES

9C. Research Facilities

BASE CIVIL ENGINEER SANITARY LABORATORY,
Air Force Academy, Colorado Springs, Colo.
For primary bibliographic entry see Field 5D.
W74-10039

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

DECOMMISSIONING OF NUCLEAR FACILITIES - A BIBLIOGRAPHY.
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- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

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W74-010351 -- W74-010900

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Rev. Aug 1974

SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

VOLUME 7, NUMBER 20
OCTOBER 15, 1974

W74-010351 -- W74-010900

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
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04 WATER QUANTITY MANAGEMENT AND CONTROL
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SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

A RESERVOIR MODEL ALTERNATIVE TO THE UNIT HYDROGRAPH FOR FLOOD ESTIMATION,
Transport and Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 4A.
W74-10432

THE ANALYSIS OF SOME MONTHLY HYDROLOGIC TIME SERIES,
Idrutecneco, San Lorenzo in Campo (Italy).
L. Torelli.
Journal of Hydrology, Vol 21, No 3, p 269-290, 1974. 7 fig, 3 tab, 9 ref.

Descriptors: *Time series analysis, *Monthly, *Temperature, *Precipitation(Atmospheric), *Streamflow, Hydrographs, *Mathematical models, *Illinois.
Identifiers: Urbana(Ill), Morrisonville(Ill), Sangamon River(Ill), Monticello(Ill), Italy, Netherlands.

The following time series are analyzed: monthly average temperatures at Urbana, Illinois (1915-1965); monthly precipitations at Morrisville, Illinois (1896-1969); and monthly streamflows in the Sangamon River at Monticello, Illinois (1915-1969). The model was previously identified and showed that a simple transformation makes the series stationary. The analysis was completed. By a joint use of spectral and regression analysis one arrives at the formulation of models in which the deterministic process and the variaces are described by means of trigonometric functions. This allows a considerable economy of parameters in comparison with the models based on the 24 sample monthly averages and variances. The practical advantages of such an economy of parameters are discussed. (Merritt-FIRL)
W74-10606

PROBLEMS OF THE EFFECT OF HUMAN ACTIVITY ON WATER RESOURCES AND WATER REGIME (VOPROSY VLIYANIYA KHOZYAYSTVENNOY DEYATEL'NOSTI NA VODNYYE RESURSY I VODNYY REZHIM),
Gusudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
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PHOTO-HYDROLOGICAL RECONNAISSANCE SURVEYS,
International Inst. for Aerial Survey and Earth Sciences, Enschede (Netherlands).
For primary bibliographic entry see Field 7B.
W74-10648

AN INTEGRATED MODEL OF STORM-GENERATED WAVES,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 2E.
W74-10653

AN ESTIMATE OF LEAKAGE FROM BLACKFOOT RESERVOIR TO BEAR RIVER BASIN, SOUTHEASTERN IDAHO,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4A.
W74-10661

RANGELAND HYDROLOGY,
Geological Survey, Denver, Colo.
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W74-10682

A COMPARISON OF PHYSICALLY-BASED INFILTRATION EQUATIONS,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
For primary bibliographic entry see Field 2G.
W74-10823

2B. Precipitation

A TWO-DIMENSIONAL WARM FOG MODIFICATION MODEL,
Geomet, Inc., Rockville, Md.
D. J. Moschandreas, R. T. Chu, and S. D. Thayer.
Available from NTIS, Springfield, Va. 22161 as AD-773 637, Price $4.00 printed copy; $2.25 microfiche. GEOMET Report No EF-295, December 31, 1973. 91 p, 22 fig, 12 tab, 26 ref, 2 append. ONR Contract N00014-70-C-0371.

Descriptors: *Weather modification, *Fog, *Cloud seeding, *Mathematical models, Simulation analysis, Advection, Mixing, Turbulence, Model studies.
Identifiers: *Warm fog, Fog dissipation.

The interaction between fog and stratus nuclei and the ambient environment was studied using a two-dimensional model. Numerical experiments simulated the dissipation of fog by seeding with hygroscopic particles. The simulation model likely to be significant, includes turbulent diffusion and advection by horizontal wind. As input it requires parameter values for the fog (droplet size and number concentration, nuclei size and chemical properties, and liquid water content) and the environment (temperature, pressure, supersaturation, specific humidity, horizontal wind speed, and vertical and horizontal turbulent diffusion coefficients). Also required are input for the initial values of the seeding material (particle size distribution, concentration, and chemical properties). The model generates the time history of the size and number concentration of seeding drops, and of the fog droplets, the liquid water content, supersaturation, and visibility. Seeding with hygroscopic particles improves the visibility of the fog layer; however, the extent of this improvement strongly depends on the environmental conditions and the characteristics of the seeding particles. (Knapp-USGS)
W74-10359

PRECIPITATION PROBABILITIES FOR EAST TENNESSEE,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
H. A. Fribourg, R. H. Strand, J. V. Vaiksnoras, and J. M. Safley, Jr.
Agricultural Experiment Station Bulletin 512, May 1973. 39 p, 1 fig, 29 tab, 16 ref. OWRR A-017-TENN(3).

Descriptors: *Precipitation(Atmospheric), *Probability, *Tennessee, Frequency analysis, Meteorological data, Weather data, Forecasting, Weather patterns.

Precipitation probabilities are compiled for the eastern part of Tennessee. For each site a table is presented which contains precipitation probabilities at selected levels of precipitation for 1-, 2-, and 4-week periods. The precipitation levels for which probabilities were computed are: at least 0.25, 0.50, 1.00, 1.50, 2.00 and 3.00 inches for 1-week periods; 0.50, 1.00, 1.50, 2.00, 3.00 and 5.00 inches for 2-week periods; and 1.00, 2.00, 3.00, 5.00 and 6.00 inches for 4-week periods. In each probability table, the mean weekly total precipitation for each 1-, 2- and 4-week period is shown for the period of record studied. (See also W74-10400 and W74-10401) (Knapp-USGS)
W74-10399

PRECIPITATION PROBABILITIES FOR MIDDLE TENNESSEE,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
R. H. Strand, H. A. Fribourg, and J. V. Vaiksnoras.
Agricultural Experiment Station Bulletin 511, May 1973. 38 p, 1 fig, 28 tab, 16 ref. OWRR A-017-TENN(2).

Descriptors: *Precipitation(Atmospheric), *Probability, *Tennessee, Frequency analysis, Meteorological data, Weather data, Forecasting, Weather patterns.

Precipitation probabilities are compiled for the central part of Tennessee. For each site a table is presented which contains precipitation probabilities at selected levels of precipitation for 1-, 2-, and 4-week periods. The precipitation levels for which probabilities were computed are: at least 0.25, 0.50, 1.00, 1.50, 2.00 and 3.00 inches for 1-week perios; 0.50, 1.00, 1.50, 2.00, 3.00, and 5.00 inches for 2-week periods; and 1.00, 2.00, 3.00, 4.00, 5.00, and 6.00 inches for 4-week periods. In each probability table, the mean weekly total precipitation for each 1-, 2-, and 4-week period is shown for the period of record studied. (See also W74-10399) (Knapp-USGS)
W74-10400

PRECIPITATION PROBABILITIES FOR WEST TENNESSEE,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
H. A. Fribourg, R. H. Strand, and J. V. Vaiksnoras.
Agricultural Experiment Station Bulletin 510, May 1973. 27 p, 1 fig, 19 tab, 16 ref. OWRR A-017-TENN(1).

Descriptors: *Precipitation(Atmospheric), *Probability, *Tennessee, Frequency analysis, Meteorological data, Weather data, Forecasting, Weather patterns.

Precipitation probabilities are compiled for the western part of Tennessee. For each site a table is presented which contains precipitation probabilities at selected levels of precipitation for 1-, 2-, and 4-week periods. The precipitation levels for which probabilities were computed are: at least 0.25, 0.50, 1.00, 1.50, 2.00, and 3.00 inches for 1-week periods; 0.50, 1.00, 1.50, 2.00, 3.00, and 5.00 inches for 2-week periods; and 1.00, 2.00, 3.00, 4.00, 5.00, and 6.00 inches for 4-week periods. In each probability table, the mean weekly total precipitation for each 1-, 2-, and 4-week period is shown for the period of record studied. (See also W74-10399) (Knapp-USGS)
W74-10401

TECHNICAL BASIS FOR INTERIM REGIONAL TORNADO CRITERIA,
Atomic Energy Commission, Washington, D.C. Office of Regulation.
E. H. Markee, Jr., J. G. Beckerley, and K. E. Sanders.
Report WASH-1300, May 1974. 23 p, 8 fig, 5 tab, 19 ref.

Descriptors: *Tornadoes, *Nuclear powerplants, *Risks, *Design storm, Design safety, Design standards, Public health, Winds, United States, *Weather forecasting.

A regionalized design tornado for predicting risks to nuclear powerplants was calculated for the contiguous United States. From an analysis of tornado classification data from the National Weather Service Offices for 1971 and 1972 and tornado occurrence data, it was concluded that three general regions with associated tornado severity and frequency of occurrence could be determined. Probable windspeeds were calculated, and cor-

responding pressure drops and rates of pressure drop were determined from the cyclostrophic equation. The numerical values for these tornado properties are considered as conservative upper bounds. The values should be lowered as may be justified when sufficient data become available. (Knapp-USGS)
W74-10433

VALIDITY OF THE MODIFIED BILHAM EQUATION,
West Riding County Council, Yorkshire (England). Highways and Bridges Dept.
R. G. Ashworth, and C. A. O'Flaherty.
Institution of Municipal Engineers, Vol 101, No 2, p 43-50, February, 1974. 12 fig, 15 ref.

Descriptors: *Rainfall intensity, *Forecasting, Storms, *Drainage systems, *Design.
Identifiers: *Bilham Equation, Isopleth diagrams, *United Kingdom(England).

The validity of the modified Bilham equation was investigated to illustrate the extent to which rainfall intensities associated with different storm durations and return periods can vary in England. The results indicate that the modified Bilham relationship can give intensity results for particular areas of the country which are significantly different from the true values. This can result in the overdesign or underdesign of drainage facilities. To minimize the wastage drainage facilities, more emphasis should be placed on local conditions. Government guidelines should be compared with that given for the locality in the appropriate isopleth diagram. If the two values differ significantly, the Meteorological Office should be consulted regarding the advisability of using local rainfall data to determine more appropriate intensity values. (Merritt-FIRL)
W74-10572

THE ANALYSIS OF SOME MONTHLY HYDROLOGIC TIME SERIES,
Idrutecneco, San Lorenzo in Campo (Italy).
For primary bibliographic entry see Field 2A.
W74-10606

LABORATORY INVESTIGATION OF ELECTRICAL DISSIPATION OF WARM FOG,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 3B.
W74-10623

EVALUATION OF A METHOD OF FOG DISPERSAL BY IONIZATION,
California State Div. of Highways, Sacramento. Transportation Lab.
For primary bibliographic entry see Field 3B.
W74-10639

EVALUATION OF A HOLLOW SPHERICAL CAVITY WITH A CIRCULAR APERTURE AS A REMOTE SENSOR OF ATMOSPHERIC INDEX OF REFRACTION,
Texas Univ., Austin. Antennas and Propagation Lab.
For primary bibliographic entry see Field 7B.
W74-10649

VERIFICATION OF RAINFALL ESTIMATES: AN ANALYSIS OF ACTIVATION PATTERNS OF ADSID AND ACOUSID SEISMIC AND ACOUSTIC INTRUSION SENSORS TO DETERMINE RAINFALL RATES,
Elgin AFB Fla. Air Weather Service.
D. H. Kampwerth, and R. A. Rasmussen.
Available from NTIS, Springfield, Va 22161 as AWS-TR-74-253 Price $3.00 printed copy; $2.25 microfiche. Air Force Air Weather Service (MAC) Technical Report 74-253, February 1974. 36 p, 16 fig, 1 tab.

Descriptors: *Rainfall intensity, *Remote sensing, *Seismic studies, *Instrumentation, Military aspects, Meteorological data, Data collections.
Identifiers: *Seismic sensors, Air Weather Service(USAF).

Rainfall rates were determined from the activation patterns of seismic and acoustic intrusion sensors at Eglin AFB, Florida in the fall of 1972. Sensor activations were recorded, analyzed, and compared with rainfall rates as determined from recording rain gages collocated with the sensor strings. In nine tests, definite sensor activation patterns were correlated with rainfall rates. Scatter diagrams were prepared and analyzed to summarize sensor activation/rainfall rate comparison. (Knapp-USGS)
W74-10674

A HISTORY OF AIR WEATHER SERVICE WEATHER MODIFICATION, 1965-1973,
For primary bibliographic entry see Field 3B.
W74-10675

OPTICAL HOLOGRAPHY APPLICATIONS FOR THE ZERO-G ATMOSPHERIC CLOUD PHYSICS LABORATORY,
National Aeronautics and Space Administration, Huntsville, George C. Marshall Space Flight Center.
R. L. Kurtz.
Available from NTIS, Springfield, Va 22161 as NASA TR R-424 Price $4.00 printed copy; $2.25 microfiche. National Aeronautics and Space Administration Technical Report R-424, May 1974. 71 p, 19 fig, 1 tab, 12 ref, append.

Descriptors: *Cloud physics, *Model studies, *Data collections, *Photography, Atmospheric physics, Clouds, Meteorology, Laboratory tests.
Identifiers: *Holography, *Lasers.

A holographic arrangement is proposed for application to the detection of particle size distribution in an atmospheric simulation cloud chamber. In this chamber particle growth rate is investigated; therefore, the proposed holographic system must capture continuous particle motion in real time. A complete description of holography is provided, both for the time-dependent case of moving scene holography and for the time-independent case of stationary holography. (Knapp-USGS)
W74-10679

RADAR IN WEATHER MODIFICATION AND HAIL CONTROL,
For primary bibliographic entry see Field 3B.
W74-10687

2C. Snow, Ice, and Frost

A SIMPLIFIED MATHEMATICAL MODEL OF AVALANCHE MOVEMENT (UPROSHCHENNAYA MATEMATICHESKAYA MODEL' DVIZHENIYA LAVINY),
Moscow State Univ., (USSR). Problemnaya Laboratoriya Nezhnykh Lavin i Selei.
V. A. Svetlosanov.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 2, p 110-112, March-April 1974. 2 fig.

Descriptors: *Mathematical models, *Avalanches, *Snow, Movement, Volume, Mass, Density, Slopes, Mountains, Equations.
Identifiers: USSR.

A mathematical model of avalanche movement down a mountain slope is described. The space occupied by snow along a mountain slope is arbitrarily divided into three parts: the x-part of the volume, which is at rest; the y-part, which is set in motion; and the z-part, which is excluded from the movement process. Analytical expressions are given for x, y, and z in the case of the coefficient of interaction between the moving mass of snow and that in the state of rest. The model can be used to determine the volume of a released avalanche as a function of initial conditions, mean angle of the mountain slope, and state of the snow. (Josefson-USGS)
W74-10377

RAIOCARBON IN GLACIAL WATER OF THE EL'BRUS REGION (RADIOUGLEROD V LEDNIKOVOY VODE PRIEL'BRUS'YA),
Akademiya Nauk URSR, Kiev. Institut Geokhimii i Fiziki Mineralov.
For primary bibliographic entry see Field 2K.
W74-10380

PHYSICS OF SNOW AND ICE (FIZIKA SNEGA I L'DA),
V. P. Gavrilo.
Akademiya Nauk SSSR Vestnik, No 4, p 125-126, April 1974.

Descriptors: *Conferences, *Snow, *Ice, Physics, Physical properties, Mechanical properties, Glaciers.
Identifiers: *USSR.

A symposium, devoted to results of recent investigations of snow and ice by electromagnetic, optical, dynamic, and static methods, was held in Leningrad, October 1-5, 1973. The symposium was sponsored by the Arctic and Antarctic Scientific Research Institute of the Hydrometeorological Service and by the Interdepartmental Commission on the Study of the Antarctic of the USSR Academy of Sciences. Participants in the symposium included about 200 representatives of 47 organizations in the USSR and guests from scientific institutes in England, Australia, Norway, the United States, France, the German Federal Republic, Czechoslovakia, and Switzerland. A total of 46 papers were presented. Attention was directed to the use of radar to study glaciers and ice of maritime and freshwater seas. New experimental data on physical properties of snow and ice in the optical range showed the importance of further development of investigations in this field. A large number of papers were devoted to methods and results of investigations of the mechanical and acoustic properties of ice and snow. (Josefson-USGS)
W74-10385

SNOW ROAD CONSTRUCTION TECHNIQUE BY LAYERED COMPACTION OF SNOW-BLOWER PROCESSED SNOW,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 8G.
W74-10403

COMPUTER SIMULATION OF SNOWMELT WITHIN A COLORADO SUBALPINE WATERSHED,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
C. F. Leaf, and G. E. Brink.
Research Paper RM-99, February 1973. 22 p, 15 fig, 1 tab, 12 ref, append.

Descriptors: *Snowmelt, *Mathematical models, *Runoff forecasting, *Computer programs, Colorado, Systems analysis, Simulation analysis, Alpine, Snowpacks, Watershed management, Forest management.
Identifiers: Fraser Experimental Forest(Colo).

A dynamic model simulates snowmelt in Colorado subalpine watersheds for all combinations of aspect, slope, elevation, forest cover composition, and forest density. The model simulates winter snow accumulation, the energy balance, snowpack

condition, and resultant melt in time and space. Detailed flow chart descriptions of the various components of the model and a program listing are presented. The model was tested on field data obtained from the 667-acre Deadhorse Creek watershed at the Fraser Experimental Forest, Colorado. Snowmelt rates at eight locations on Deadhorse Creek were reconstituted. Agreement between observed and simulated melt rates was good at all locations. The model is structured so that a minimum number of variables must be adjusted to obtain a satisfactory fit. In this case, only two variables were adjusted to obtain satisfactory agreement: (1) cover density (a vegetation type and composition parameter), and (2) a shortwave radiation transmissivity coefficient. (Knapp-USGS)
W74-10424

SEA ICE CONDITIONS IN THE COOK INLET, ALASKA DURING THE 1971-72 WINTER,
National Weather Service, Anchorage, Alaska.
R. J. Hutcheon.
Available from NTIS, Springfield, Va. 22161 as COM-73-10773, Price $3.00 printed copy; $2.25 microfiche. Technical Memorandum NWS AR-8, April 1973. 17 p, 2 fig, 3 tab.

Descriptors: *Sea ice, *Estuaries, *Fjords, *Alaska, Ice cover, Freezing, Weather, Temperature.
Identifiers: *Cook Inlet(Alaska).

In Cook Inlet, Alaska, the development of ice began slowly during the late fall of 1971, but persistent below-normal temperatures during January, February, and March of 1972 resulted in a long and rough ice year. By the end of March, accumulation of ice was almost as great as the seasonal ice accumulation of a winter in the coldest 10% of winters of record. Below-normal temperatures throughout April and during the first part of May resulted in a slow decrease in the ice during the spring. (Knapp-USGS)
W74-10428

RELIABILITY OF SNOWMELT RUNOFF PREDICTIONS BASED ON MASS BALANCE PROCEDURES VERSUS INDEX METHODS,
Wyoming Univ., Laramie. Water Resources Research Inst.
V. E. Smith, L. R. Bartos, and P. A. Rechard.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 427, $3.75 in paper copy, $2.25 in microfiche. Completion Report, Water Resources Series No. 42, December 1973. 68 p, 16 fig, 26 tab, 19 ref. OWRR C-3129 (No 3690)(2).

Descriptors: *Snow surveys, *Snow cover, Snowpacks, *Runoff forecasting, Measurement, *Wyoming, Alpine, Small watersheds, Sampling, Reliability, Stratification.
Identifiers: *Snow density, *Snow depth, *Mass balance procedures, Snow index method.

Extensive measurements of snow water equivalent, depth density and runoff were made in the late winter and spring of 1972 and 1973 on a small subalpine watershed in Wyoming. Stratification of areas within the basin, particularly forested to non-forested, was found to be necessary. After ablation began, elevation stratification was also necessary. Areas subject to high winds had large depth variations, requiring large sample sizes. A sampling procedure was developed from which fairly good estimates of water equivalent in the basin were obtained. The procedure appears to be applicable to snow pack determinations for short range runoff forecasting.
W74-10536

LOW WINTER DISSOLVED OXYGEN IN SOME ALASKAN RIVERS,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
For primary bibliographic entry see Field 5B.
W74-10546

BIOLOGICAL TREATMENT OF AIRPORT WASTEWATER CONTAINING AIRCRAFT DE-ICING FLUIDS,
Environmental Protection Service, Burlington (Ontario). Wastewater Technology Centre.
For primary bibliographic entry see Field 5D.
W74-10552

OZONE TREATS ARCTIC WATERS,
Arctic Health Research Centre, College, Alaska. Environmental Sciences Branch.
For primary bibliographic entry see Field 5F.
W74-10556

ICE RIFTER,
R. W. Worthing.
U S Patent No 3,807,180, 4 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 1809, April 30, 1974.

Descriptors: *Patents, *Iced lakes, Equipment, Navigation.
Identifiers: *Ice breakers, Ice breakup.

The ice rifter is a submersible ice breaker which consists of a platform supported by a buoyant device. The platform may be submerged by varying the buoyancy of ballast tanks. Piercing or perforating devices affixed along at least one edge of the platform are directed towards the ice to weaken or perforate the ice. A pair of hydraulic pistons disposed on opposite sides of a centerline of the platform and pivotally connected at their free ends may be equally energized to lift the ice above the level of adjacent ice. One of the pistons may be energized more than the other to tilt the platform so that the ice may slide onto the adjacent remaining ice. (Sinha-OEIS)
W74-10578

REGIME OF SNOW-AVALANCHE DESCENT IN NORTHERN TRANSBAYKAL (REZHIM SKHODA SNEZHNYKH LAVIN NA SEVERE ZABAYKAL'YA),
Institute of Geography of Siberia and the Far East, Irkutsk (USSR).
V. R. Alekseyev, and A. V. Kirichenko.
Institut Geografii Sibiri i Dal'nego Vostoka Doklady, No 35, p 40-49, 1972. 2 fig, 4 tab, 10 ref.

Descriptors: *Avalanches, *Snow, Movement, *Mountains, *Slopes, Snowfall, Storms, Thawing, Seasonal, Mapping.
Identifiers: *USSR(Transbaykal), Isolines.

The status of investigations of snow avalanches in Northern Transbaykal is examined, and data are presented on release of snow from slopes on the Yuzhno-Muya and Udokan mountain ridges. A relation is established between avalanche descent and snowfalls, snowstorms, and thawing. Mountainous regions of Northern Transbaykal are characterized by a high degree of avalanche hazard. Most snow avalanches occur in March, April, and May and, occasionally, in October and June. In high-mountain regions, release of snow is possible at any time. Construction in mountainous regions should be preceded by special snow-avalanche work, accompanied by a study of snow-avalanche descent conditions and by compilation of maps of avalanche danger. The problem of organizing a special snow-avalanche station is discussed in connection with the proposed reclamation of the area. (Josefson-USGS)
W74-10625

A RESEARCH HYDRAULIC FLUME FOR MODELING DRIFTING SNOW - DESIGN, CONSTRUCTION AND CALIBRATION,
Cold Regions Research and Engineering Lab., Hanover, N.H.
D. J. Calkins.
Technical Report 251, June 1974. 14 p, 12 fig, 10 ref.

Descriptors: *Hydraulic models, *Flumes, *Snow cover, *Sediment transport, *Sedimentation, Snow, Sedimentary structures, Snow management, Model studies.
Identifiers: Snow drifting.

To model drifting snow, a fluvial bed hydraulic flume was designed and constructed. Each section has bolted connections which allow flexibility if a section needs to be modified. For example, glass viewing panels are individually clamped at the top so a single sheet can be replaced with minimal difficulty. The operation of the flume facility was designed to be simple. Three butterfly valves control the operation of the storage tank system, and a variable-speed control on the pump-motor unit permits a wide range of flow velocities for any given depth. The discharge can be monitored continuously from a differential-pressure transducer which is connected to the venturi. Ease of operations allows for a greater flexibility in the design of experiments. (Knapp-USGS)
W74-10644

EQUIPMENT FOR MEASURING THE WATER PERMEABILITY AS A FUNCTION OF DEGREE OF SATURATION FOR FROST SUSCEPTIBLE SOILS,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 2G.
W74-10657

AREAL SNOWPACK WATER-EQUIVALENT DETERMINATIONS USING AIRBORNE MEASUREMENTS OF PASSIVE TERRESTRIAL GAMMA RADIATION,
EG and G, Inc., Las Vegas, Nev.
E. B. Jones, A. E. Fritzsche, Z. G. Burson, and D. L. Burge.
Available from NTIS, Springfield, Va. 22161 as Conf-73-1201-1, Price $3.00 printed copy; $2.25 microfiche. Reprint of Paper presented at the Interdisciplinary Symposium on Advanced Concepts and Techniques in the Study of Snow and Ice Resources, December 2-6, 1973, Monterey, Calif. 10 p, 2 fig, 3 tab, 11 ref.

Descriptors: *Snow surveys, *Water equivalent, *Snowpacks, *Remote sensing, *Gamma rays, Nuclear moisture meters, Calibrations, Data collections, Water yield, Runoff forecasting.

Airborne measurement of the water equivalent of snow by the terrestrial gamma attenuation method is accurate to 10%. Airborne survey data from study areas in the midwest show that airborne radon-daughters, soil moisture, and gamma counting statistics are the predominant sources of error. The method has good potential for large, rapid areal measurements of water equivalent over flat or rolling terrain. (Knapp-USGS)
W74-10681

HYDROSTRATIGRAPHIC UNITS OF SURFICIAL DEPOSITS OF EAST-CENTRAL ILLINOIS,
Illinois Univ., Urbana. Dept. of Geology.
For primary bibliographic entry see Field 2J.
W74-10852

2D. Evaporation and Transpiration

TOWARD THE STRUCTURE OF A PRODUCTION FUNCTION FOR WHEAT YIELDS WITH DATED INPUTS OF IRRIGATION WATER,
Indian Statistical Inst., New Delhi. Planning Unit.
For primary bibliographic entry see Field 3F.
W74-10600

IRRETRIEVABLE RUNOFF LOSSES OF THE VOLGA RIVER THROUGH EVAPORATION FROM RESERVOIRS OF THE VOLGA-KAMA CASCADE (BEZVOZVRATNYYE POTERI STOKA R. VOLGI ZA SCHET ISPARENIYA S VODOKHRANILISHCH VOLZHSKO-KAMSKOGO KASKADA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4A.
W74-10628

REFLECTANT INDUCED MODIFICATION OF SOYBEAN CANOPY RADIATION BALANCE: 1. PRELIMINARY TESTS WITH A KAOLINITE REFLECTANT,
Nebraska Univ., Lincoln. Dept. of Agricultural Climatology.
P. C. Doraiswamy, and N. J. Rosenberg.
Agronomy Journal, Vol 66, p 224-228, March-April 1974. 5 fig, 3 tab, 14 ref. OWRR A-017-NEB (7).

Descriptors: *Solar radiation, *Energy budget, *Soybeans, *Evapotranspiration, *Water balance, Water conservation, Consumptive use, Crop response, Radiation, Albedo, Microenvironment, Kaolinite.

Soybeans were coated with kaolinite to test whether reflection of incident solar radiation can be effectively increased in the field. Increased reflection reduces the amount of radiant energy available and hence reduces the quantity of water consumed by transpiration. Total reflection (300 to 3,000 nm) from the coated crop was increased by about 8%. Net radiation was decreased by about 8%. Spectral reflection was increased primarily in the visible range (380 to 750 nm). Differences in'0 reflection were minor in the near infrared range (750 to 1,150 or 1,550 nm). Treatment caused some redistribution of light onto the lower canopy. (Knapp-USGS)
W74-10668

RANGELAND HYDROLOGY,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4A.
W74-10682

A QUICK-WEIGHING LYSIMETER SYSTEM CHECK,
Agricultural Research Service, Prosser, Wash. Irrigated Agriculture Research and Extension Center.
For primary bibliographic entry see Field 7B.
W74-10749

CALCULATION OF EVAPORATION FROM MEASUREMENTS OF SOIL WATER AND THE SOIL WATER CHARACTERISTIC,
Guelph Univ. (Ontario). School of Engineering.
W. N. Stammers, O. C. Igwe, and H. R. Whiteley.
Canadian Agricultural Engineering, Vol 15, No 1, p 2-5, June, 1973. 6 tab, 5 ref.

Descriptors: *Evaporation, *Soil surfaces, Evapotranspiration, Soil moisture, *Soil water, Soil types, Mathematical models.

An approach based on the existence of a plane of zero soil-water flux is used to develop a model for calculating evaporation from soil-water measurement. The information required is a knowledge of soil water, capillary potential relationships for the soil considered, and soil-water content at the beginning and end of each time period of evaporation computation. This approach yields results that do not differ significantly from those obtained by assuming a fixed soil depth for calculations and ignoring soil-water seepage. (Skogerboe-Colorado State)
W74-10758

THE EFFECTS OF TRANSVERSE CUTS THROUGH THE STEMS OF TRANSPIRING WOODY PLANTS ON WATER TRANSPORT AND STRESS IN THE LEAVES,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Forest Products Lab.
J. F. G. MacKay, and P. E. Weatherly.
J Exp Bot. Vol 24, No 78, p 15-28. 1973. Illus.
Identifiers: *Acer-pseudoplatanus, *Gossypium-hirsutum, *Leaves(Moisture stress), Stems, Temperature, Transverse cuts, *Woody plants, *Transpiration.

Both single and double-overlapping transverse cuts were made in the stems of transpiring plants (Acer pseudoplatanus and Gossypium hirsutum) and their effects on transpiration and water stress in the leaves studied. Water stress was measured as depression of water potential and beta-gauge reading. Results were similar with both species. Single cuts severing as much as 90% of the cross-sectional area of the stem had no detectable effect on the rate of transpiration or on stress in the leaves above. Double overlapping cross cuts caused irreversible increased stress and cessation of sap flow only if their vertical separation was less than a critical distance, specific for each species and related to the respective vessel lengths. Cuts separated by more than this distance had no detectable effect on stress and transpiration rate was unchanged. Also no effect was detected if a length of the stem between such cuts was cooled to near-freezing temperature, or killed by steam treatment. Patterns of heat pulse velocities showed how the sap was channelled around the cuts through remaining intact xylem.--Copyright 1973, Biological Abstracts, Inc.
W74-10790

ESTIMATING TRANSPIRATION RESISTANCE,
Kansas State Univ., Manhattan. Dept. of Agronomy.
L. J. Brun, E. T. Kanemasu, and W. L. Powers.
Agron J. Vol 65 No 2 p 326-328, 1973. Illus.
Identifiers: *Sorghum-bicolor, *Transpiration resistance, *Stomata, Diffusion porometer, Evapotranspiration, Lysimeters, Crop canopy, Methodology.

Transpiration resistance was determined in a sorghum (Sorghum bicolor (L.) Moench.) canopy by 2 methods based on the stomatal resistance of all the leaves on a plant and a third method based on the stomatal resistance of only the upper 3 leaves. Stomatal resistance was measured with the diffusion porometer. The 3 methods of determining transpiration resistance included: (1) harmonically averaging the stomatal resistance of all the leaves on a plant; (2) dividing the crop canopy into layers and weighing each layer resistance by its leaf area index; and (3) harmonically averaging the stomatal resistance of the upper 3 leaves of the plant. Methods 1 and 2 gave almost identical estimates of transpiration resistance. When methods 1 and 3 were evaluated by the Monteith evapotranspiration model, the evapotranspiration estimate using method 1 gave closer agreement with lysimeter evapotranspiration than when method 3 was used in the model.--Copyright 1973, Biological Abstracts, Inc.
W74-10806

2E. Streamflow and Runoff

THE KINEMATICS OF WATER PARTICLE OF BREAKING WAVES WITHIN THE SURF ZONE,
Naval Postgraduate School, Monterey, Calif.
E. B. Thornton, and D. P. Richardson.
Available from NTIS, Springfield, Va 22161 as AD-773 754, Price $3.25 printed copy; $2.25 microfiche. Technical Report NPS-58TM74011A, January 1974. 34 p, 12 fig, 1 tab, 12 ref.

Descriptors: *Waves(Water), *Surf, Currents(Water), Turbulence, Velocity, Statistical methods.

Simultaneous measurements of waves, and vertical and horizontal water particle velocities were made at the breaker line within the surf zone using a capacitance type penetrating wave staff, a pressure wave gage, and an electromagnetic current meter. Wave measurements were also made at seaward and shoreward locations. The wave energy-density spectral components were converted to velocity spectral components using linear wave theory. These computed values compared well qualitatively with the measured velocity spectra. Linear theory underpredicted wave-induced horizontal velocity spectral components by about 50% at the frequency of peak energy. The coherence values between waves and horizontal velocity were high, ranging above 0.75. The phase angle computation showed the calculated velocity components leading the measured velocity components by an average of 20 degrees, indicating an unstable wave crest leading the particle motion in the body of the wave. Probability density functions were computed and compared to Gaussian and Gram-Charlier distributions using the chi-square goodness-of-fit test. The Gram-Charlier distribution qualitatively gave the better fit to the data. (Knapp-USGS)
W74-10409

OREGON'S NEARSHORE OCEAN,
Oregon State Univ., Corvallis. Marine Advisory Program.
For primary bibliographic entry see Field 2L.
W74-10431

A RESERVOIR MODEL ALTERNATIVE TO THE UNIT HYDROGRAPH FOR FLOOD ESTIMATION,
Transport and Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 4A.
W74-10432

SUMMARY OF TURBULENCE DATA FROM RIVERS, CONVEYANCE CHANNELS, AND LABORATORY FLUMES,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 8B.
W74-10435

SAMPLING AND FLOW MEASURING DEVICE,
For primary bibliographic entry see Field 7B.
W74-10484

THE DESIGN OF SAMPLING PROGRAMMES FOR RIVERS AND EFFLUENTS,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 7A.
W74-10576

PROBLEMS OF THE EFFECT OF HUMAN ACTIVITY ON WATER RESOURCES AND WATER REGIME (VOPROSY VLIYANIYA KHOZYAYSTVENNOY DEYATEL'NOSTI NA VODNYYE RESURSY I VODNYY REZHIM),
Gusudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10626

EVALUATION OF THE EFFECT OF HUMAN ACTIVITY ON RUNOFF OF LARGE RIVERS IN THE CAUCASUS (KURA, TEREK, KUBAN') (OTSENKA VLIYANIYA KHOZYAYSTVENNOY DEYATEL'NOSTI NA STOK KRUPNYKH REK KAVKAZA (KURA, TEREK, KUBAN')),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).

For primary bibliographic entry see Field 4C.
W74-10630

FLOOD HAZARD ANALYSES, BONNER BRANCH OF THE PECATONICA RIVER, BELMONT, WISCONSIN.
Soil Conservation Service, Madison, Wis.
Flood Hazard Report, October 1973. 7 p, 9 fig.

Descriptors: *Floods, *Wisconsin, Water levels, Discharge(Water), Damages, Flood control, Hydrologic data.
Identifiers: *Belmont(Wisc).

Flood-prone areas are identified within and near the village of Belmont, Wisconsin. The floods of July 1950, and June 1969, and most other floods have been generated by summer thunderstorm precipitation. Flood damages in Belmont are slight, primarily because development has been outside of the flood plain. (Knapp-USGS)
W74-10635

HYDROLOGIC DATA FOR NORTH CREEK TRINITY RIVER BASIN TEXAS, 1972,
Geological Survey, Austin Tex.
For primary bibliographic entry see Field 7C.
W74-10640

TIME OF TRAVEL OF SOLUTES IN MISSISSIPPI RIVER FROM BATON ROUGE TO POINTE A LA HACHE, LOUISIANA,
Geological Survey, Baton Rouge, La.
For primary bibliographic entry see Field 5B.
W74-10646

AN INVESTIGATION OF THE STRUCTURE OF TURBULENCE OVER WATER SURFACE WAVES,
Michigan Univ., Ann Arbor. Dept. of Atmospheric and Oceanic Science.
D. J. Portman, and K. L. Davidson.
Available from NTIS, Springfield, Va. 22161 as AD-771 471, Price $3.00 printed copy; $2.25 microfiche. Final Contract Report for Office of Naval Research, November 1973. 19 p. ONR Contract N00014-67-A-0181-0005.

Descriptors: *Waves(Water), *Winds, *Turbulence, *Heat flow, *Air-water interfaces, Energy budget, Heat transfer, Meteorology, Abstracts, Bibliographies.

The influence of waves on the three-dimensional structure of turbulence and the vertical fluxes of momentum and sensible heat was studied by measuring wind velocity and air temperature fluctuations above waves. Analyses were made primarily in terms of variancec, covariances, spectrum and cross-spectrum functions, and joint distribution functions of the measured variables. Methods of measurement and data processing are reviewed and 14 abstracts of reports, theses, and papers resulting from the investigation are presented. (Knapp-USGS)
W74-10650

AN INTEGRATED MODEL OF STORM-GENERATED WAVES,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
D. T. Resio, and B. P. Hayden.
Available from NTIS, Springfield, Va 22161 as AD-774 915 Price $6.50 printed copy; $2.25 microfiche. Technical Report No 8, December 1973. 270 p, 41 fig, 21 tab, 110 ref, 6 append. ONR Contract N00014-69-A-0060-0006.

Descriptors: *Waves(Water), *Storm surge, *Mathematical models, Climatology, Probability, Surf, Beach erosion, Forecasting, Storms, Frequency analysis, Statistical models, Hurricanes, Cyclones.

Sequential information on waves and storm surges generated by winter extratropical cyclones is used in a model which integrates three scales of atmospheric motions (large-scale, synoptic scale, and small scale) into an estimation of winter wave-surge climate for the mid-Atlantic coast, making possible the investigation of additional facets of wave climates such as secular and seasonal variations. A spectral model for wave generation and a bathystrophic model for wind-driven surges are used to estimate incident wave and surge heights along the east coast of the United States. Effects of shoaling and refraction are included as a function of angle of incidence and frequency for parallel bottom contours, and a significant breaker height is calculated. Waves and surges along the coast are linked to extratropical cyclones by relating the time-dependent wind-fetch field to storm size, shape, rate of movement, and direction of movement. From storm probabilities, joint probabilities of significant breaker heights and surge heights are calculated using previously derived relationships between storm characteristics and wave-surge generation. Results indicate highly significant secular and seasonal variations in large-scale circulation patterns. Associated with the large-scale changes are changes in storm frequency of 20% or more along some tracks. Additional information is available from the model to give estimates of wave sequences, wave-height durations, and accompanying surge height. (Knapp-USGS)
W74-10653

MISSOURI RIVER HYDROLOGY (STREAMFLOW AND TEMPERATURE)--SIOUX CITY, IOWA TO RULO, NEBRASKA,
Battelle-Pacific Northwest Lab., Richland, Wash.
D. L. Schreiber.
Report 1692, October 1972. 34 p, 7 fig, 4 tab, 6 ref.

Descriptors: *Missouri River, *Low flow, *Water temperature, Water resources development, Reservoir operation, River basin development, *Streamflow, *Iowa, *Nebraska.

The Missouri River is characterized by wide variations in seasonal flow; lowest flows occur during the winter months. A complicating factor during the winter is ice, which may cover the river as far south as Kansas City, Missouri. When the ice cover breaks up, significant ice jams may form and cause resultant flooding. Discharges are significantly increased in the spring due to snowmelt, and low flows generally prevail during the late summer and early fall. Missouri River stream flow characteristics are further complicated by six large storage reservoirs located on the main stem above Sioux City, Iowa. These reservoirs have a total flood storage capacity of almost 12 million acre-feet. Low-flow frequency curves are presented for four stations below the Missouri River main stem reservoir system. Once-in-ten-years, lowest average flows for seven consecutive summer days under present water resources development are as follows: Sioux City, Iowa, 23,700 cfs; Omaha, Nebraska, 25,600 cfs; Nebraska City, Nebraska, 30,900 cfs; and Rulo, Nebraska, 31,800 cfs. The once-in-ten-years, lowest average flows for seven consecutive winter days, including icing conditions, are the following for present basin development: Sioux City, Iowa, 5,000 cfs; Omaha, Nebraska, 7,000 cfs; Nebraska City, Nebraska, 8,000 cfs; and Rulo, Nebraska, 8,700 cfs. Barring major changes in present Federal laws or policy, industrial uses of the Missouri River for cooling purposes will be severely limited by the year 2020 because of depletion for other water resources development. Neither temperature changes between stations nor diurnal temperature changes at any one station appear to pose any additional constraints for industrial use of the Missouri River water in this reach for cooling purposes. (Knapp-USGS)
W74-10659

RANDOM-ACCESS TECHNIQUE FOR MODULAR BATHYMETRY DATA STORAGE IN A CONTINENTAL-SHELF WAVE-REFRACTION PROGRAM,
National Aeronautics and Space Administration, Langley Station, Langley Research Center.
For primary bibliographic entry see Field 7C.
W74-10671

SURFACE WATER SYSTEM -- 1973,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 7C.
W74-10695

STREAM GAGING BY CONTINUOUS INJECTION OF TRACER ELEMENTS,
Arizona Univ., Tucson.
W. L. Werrell.
M Sc Thesis, 1967. 85 p, 11 fig, 1 tab, 11 ref, 4 append.

Descriptors: Streams, Gaging, *Tracers, Tracer elements, Dye concentrations, Laboratory tests, *Fluorescent dye, Gaging stations, Streamflow, Discharge, *Surface waters.
Identifiers: *Fluorescent dye-tracer elements, Dye-dilution, Fluorometry.

The practical application of the use of fluorescent-dye tracer elements as a means of determining stream discharge was studied. Although this approach is not new in principle, recent developments in fluorometry and the development of new and less expensive fluorescent dyes warrant reappraisal of the method. During this study, the proper use of the fluorometer was mastered, properties of the dye were examined by laboratory tests, and four field tests were conducted. Three of the field tests allowed direct comparison between discharge computed by the dye-dilution method and discharge measured by a current meter; the maximum variation between the results of these tests was 11 percent. The dye-dilution method may be used on streams in the Southwest for high-water measurements of flow above wading stage where no cableway is present or where no adequate current-meter measurement section can be found. The possibility of future automation of this measurement system holds promise for the rating of new gaging stations and for providing streamflow records in remote areas. (Staplin-NWWA)
W74-10826

2F. Groundwater

ANALOG MODEL STUDY OF THE GROUND-WATER BASIN OF THE UPPER COACHELLA VALLEY, CALIFORNIA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-10363

DETERMINATION OF AVERAGE GRAIN SPHERICITY IN GRANULAR POROUS MEDIA,
Regional Engineering Coll., Rourkela (India). Dept. of Geology.
For primary bibliographic entry see Field 2J.
W74-10369

GEOLOGY AND HYDROLOGY OF RICE COUNTY, CENTRAL KANSAS,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 4B.
W74-10408

ESSENTIALS OF GROUND-WATER HYDROLOGY PERTINENT TO WATER-RESOURCES PLANNING,
Water Resources Council, Washington, D.C. Hydrology Committee.

Bulletin No 16, August 1973. 48 p, 7 fig, 3 tab, 45 ref.

Descriptors: *U.S. Water Resources Council, *Hydrogeology, *Water management(Applied), *Mathematical models, Optimization, Design, Water yield, Groundwater movement, Planning, Management, Water resources development.

Recent advances in investigative and analytical methods of groundwater hydrology, coupled with well-established fundamental principles of groundwater behavior and a fund of descriptive knowledge of the groundwater reservoirs of the United States, provide firm footing for accelerated planning for management. Being a mobile resource, groundwater can be manipulated and managed. Modeling methods for simulation analysis constitute powerful tools for prediction of the effects of groundwater withdrawals and design of management programs. Modeling is limited by the magnitude and cost of the field effort to collect new, sufficient hydrologic and geologic data for proper description of the groundwater reservoirs and their functional characteristics. Prediction of groundwater quality behavior, though lagging behind groundwater flow methods, is progressing rapidly with marked advances in the past decade. (Knapp-USGS)
W74-10410

WATER-TABLE CONTOUR MAP, ANCHORAGE AREA, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 7C.
W74-10436

INFORMATION STORAGE AND RETRIEVAL SYSTEM FOR WELL HYDROGRAPH DATA USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 4B.
W74-10442

AN EVALUATION OF SUBSURFACE TECHNIQUES FOR AQUIFER PREDICTION IN COMPLEX SEDIMENTARY SYSTEMS,
Mississippi State Univ., State College. Dept. of Geology and Geography.
D. M. Keady, E. E. Russell, and T. W. Lins.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 426, $3.25 in paper copy, $2.25 in microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report, 1974. 30 p, 13 fig, 6 ref. OWRR A-074-MISS(1).

Descriptors: *Deposition(Sediments), Geology, *Groundwater, Aquifers, *Mississippi, Sands, Hydrogeology, *Clays, Subsurface investigations, *Forecasting, *Electric well logging, Sediments, Aquifer characteristics.
Identifiers: *Marine clays, *Coastal clastic-fluvial systems, *Aquifer prediction.

The feasibility of using a depositional systems approach to aquifer prediction in complex sedimentary systems was examined. Data were obtained from electrical logs of 158 oil tests and 69 water wells in 31 counties in Mississippi where the lower Wilcox is an aquifer. Three major depositional systems were recognized--a thick marine clay, a coastal clastic wedge, and a coarse coastal clastic-fluvial system. These systems include portions of the Porters Creek, Naheola, and lower Wilcox Formations. All three systems thicken downdip. Updip, the upper part of the marine clay and the coastal clastic wedge become coarser-grained and, in places, are truncated. Here, the fluvial system rests directly on the marine clays. Primary aquifers are in sands associated with the coarse coastal clastic-fluvial system, and secondary aquifers occur locally in the coastal clastic wedge. Three areas of thick sand accumulation (composite thickness greater than 200 feet) were delineated. Updip from these three areas, sands become thinner, less numerous, and aquifer prediction becomes difficult.
W74-10533

APPLICATION OF GROUNDWATER HYDRAULICS TO A BASALTIC WATER-TABLE AQUIFER,
Central Groundwater Board, Nagpur (India).
For primary bibliographic entry see Field 4B.
W74-10569

CALCULATION OF GROUNDWATER RECHARGE AND EVALUATION OF THE EFFECT OF LAND- AND FOREST-IMPROVEMENT PRACTICES (RASCHET PITANIYA GRUNTOVYKH VOD I OTSENKA VLLYANIYA NA NEGO AGROLESOMELIORATIVNYKH MEROPRIYATIY),
Gosudarstvennyii Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10629

APPLICATION OF GEOPHYSICAL METHODS IN THE INVESTIGATION OF MINERAL AND THERMAL WATERS,
Institute for Geological and Geophysical Research, Belgrade (Yugoslavia).
For primary bibliographic entry see Field 4B.
W74-10645

WATER AVAILABILITY IN CENTRAL WISCONSIN - AN AREA OF NEAR-SURFACE CRYSTALLINE ROCK,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-10647

AN ESTIMATE OF LEAKAGE FROM BLACKFOOT RESERVOIR TO BEAR RIVER BASIN, SOUTHEASTERN IDAHO,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4A.
W74-10661

TEMPERATURE TRANSIENTS IN FLOWING BOREHOLES,
Oregon State Univ., Corvallis.
G. Bodvarsson, R. S.-M. Lu, and R. P. Lowell.
Geothermics, Vol 3, No 1, p 21-24, March 1974. 1 fig, 3 ref.

Descriptors: *Geothermal studies, *Boreholes, Geophysics, Porous media, Heat flow, Water yield, Flow, Mass transfer, Heat transfer, *Water temperature.
Identifiers: *Temperature transients.

Temperature transients were analyzed in a borehole in an isothermal homogeneous solid, flowing at a constant rate. When the temperature of the fluid entering the borehole at the bottom is raised by a given amount the theoretical expression for the temperature response of the borehole and a few numerical data of practical value are given. (Knapp-USGS)
W74-10677

OGALLALA AQUIFER WATER-LEVEL DATA, WITH INTERPRETATION, 1965-1974,
High Plains Underground Water Conservation District No. 1, Lubbock, Tex.
For primary bibliographic entry see Field 4B.
W74-10685

RESISTIVITY METHODS IN PROSPECTING FOR GROUND WATER,
Kansas State Univ., Manhattan. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-10832

HYDROGEOLOGY FIELD TRIP, EAST BAY AREA AND NORTHERN SANTA CLARA VALLEY,
Stanford Univ., Calif.
S. N. Davis.
California Division of Mines and Geology, Bulletin 190, p 465-471, 1966. 6 fig.

Descriptors: Aquifer characteristics, *Hydrogeology, Groundwater resources, Sand aquifers, Water table, Water yield, *California, *Field investigations, Wells.
Identifiers: *San Francisco Bay, *Hydrogeologic field studies.

A hydrogeologic field trip is described that covers an area adjacent to the southern part of San Francisco Bay. The 90 mile trip contains five stops and points to several groundwater problems in the area, such as declining groundwater levels, land subsidence, seawater intrusion, correlation of aquifers, location and design of recharge basins, and the barrier effects of active faults. Aquifer reservoirs encountered include limestone, sandstone, fractured shale, basalt serpentine, and alluvium. In terms of areal extent and total production, the alluvium reservoirs are the most prolific. The alluvial aquifers consist of lenses of gravel that yield more than 3,000 gallons per minute. In contrast, the indurated aquifers rarely yield more than five gallons per minute. Most wells near the present shoreline encounter alluvial silts, sands, and gravels, with less than 50% of the deposits having a marine or lagoonal origin. Inland wells encounter mostly alluvial deposits, with less than 10% of the deposits having a marine origin. (Martino-NWWA)
W74-10850

THE DISTRIBUTION OF MINOR ELEMENTS BETWEEN COEXISTING CALCITE AND DOLOMITE IN THE GASPORT MEMBER OF THE LOCKPORT FORMATION, LOCKPORT, NEW YORK,
New York State Univ., Buffalo.
P. J. Michalski.
MA Thesis June, 1969. 53 p, 14 fig, 5 tab, 19 ref, 1 append.

Descriptors: *Carbonates, Calcite, *Dolomite, *Magnesium, *Iron, *Manganese, Chemical reactions, Petrography, *Groundwater, *New York, Trace elements, Distribution, Path of pollutants.

Analyses of the carbonates, (calcite and dolomite), in the Gasport Member of the Lockport Formation indicate Fe and Mn are proportional to the dolomite concentration. The separate analysis of each of the coexisting carbonate phases indicates large amounts of Mg, Fe and Mn may substitute in calcite prior to or during dolomitization. Petrographic and chemical evidence indicate the incorporation of Mg, Fe and Mn in calcite may be an intermediate step in the formation of dolomite and the increased concentration of these elements in calcite, as dolomitization proceeds may represent arrested stages of dolomitization. Future studies of calcite-dolomite assembleges should include a quantitative examination of the insoluble residue to see what correlation, if any, exists between the chemical composition of the insolubles and the dolomite content. An electron micro-probe study of the calcite and dolomite in both high and low dolomite samples would be useful in determining the extent of replacement of Mg, Fe, and Mn in calcite and dolomite. (Campbell-NWWA)
W74-10861

THE OCCURRENCE OF WATER IN THE PRECAMBRIAN CRYSTALLINE ROCKS OF THE NEW JERSEY HIGHLANDS,
Rutgers. The State Univ., New Brunswick, N.J.
For primary bibliographic entry see Field 4B.
W74-10872

HOW WELLS AFFECT SHALLOW GLACIAL GROUND-WATER SUPPLIES IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Agricultural Extension Service.
For primary bibliographic entry see Field 4B.
W74-10873

HAMMAT GADER (ISRAEL): GEOCHEMISTRY OF A MIXED THERMAL SPRING COMPLEX,
Weizmann Inst. of Science, Rehovot (Israel).
E. Mazor, A. Kaufman, and I. Carmi.
Journal of Hydrology, Vol 18, No 3/4, p 289-303, March, 1973. 8 fig, 7 tab, 14 ref.

Descriptors: *Groundwater, *Salinity, *Springs, Thermal springs, Cold springs, Mineral water, Spring waters, Water types.
Identifiers: *Israel(Hammat Gader).

A complex of four spring groups has been studied. The temperature and concentrations of dissolved ions reveal the springs to be mixtures of two types of water whose characteristics were deduced by extrapolation. The hot end member is enriched in He4, Ra226 and nitrogen, flushed from the hot aquifer rocks. The Ne, Ar, Kr, and Xe have atmospheric isotopic compositions and occur in relative elemental abundances similar to those dissolved in air-saturated water. This indicates that both water end members originated from rain water that equilibrated with air and infiltrated into the ground. The Ar, Kr and Xe concentrations revealed that both water types were formed from rains that entered the ground at 'paleotemperatures' of 19 plus or minus 3C. The tritium and C14 values indicate the true hot end member to have an age older than 11,700 years whereas the true cold end member has an age of 12,000 plus or minus 1,500 years. The cold spring D is mixed with about 3% post-nuclear-tests rain water. (Skogerboe-Colorado State)
W74-10880

2G. Water In Soils

CLASSIFICATION, ENGINEERING PROPERTIES AND FIELD EXPLORATION OF SOILS, INTACT ROCK AND IN SITU ROCK MASSES,
Newmark (Nathan M.) Consulting Engineering Services, Urbana, Ill.
For primary bibliographic entry see Field 8E.
W74-10356

QUALITATIVE FEATURES OF HUMUS IN IRRIGATED CHESTNUT (GREYISH-BROWN) SOILS OF THE KARABAKH STEPPE, (IN RUSSIAN),
For primary bibliographic entry see Field 3F.
W74-10425

EFFECT OF DRAIN DEPTH AND GAP WIDTH ON POTENTIAL FLOW IN HOMOGENEOUS POROUS SOIL,
Waikato Univ., Hamilton (New Zealand). Dept. of Mathematics.
For primary bibliographic entry see Field 4A.
W74-10568

FUNCTIONING PROCESS OF DRAINAGE IN HYDROMORPHIC WASHED SOIL (SUR LE PROCESSUS DE FONCTIONNEMENT DES DRAINS EN SOL LESSIVE HYDROMORPHE),
Institut National de la Recherche Agronomique, Dijon (France). Station d'Agronomie.
For primary bibliographic entry see Field 4A.
W74-10570

SENSING OF MOISTURE CONTENT IN SOIL,
Wescor, Inc., Logan, Utah.
W. K. Barlow, E. C. Campbell, and R. G. Crockett.
U.S. Patent No. 3,803,570, 5 p, 6 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 921, No 2, p 815, April 9, 1974.

Descriptors: *Patents, *Moisture content, Water management(Applied), *Soil moisture, Equipment, Measurement, Instrumentation, Irrigation.
Identifiers: *Sensors, Indicators.

The soil moisture indicating system consists of a support assembly formed with a soil anchor at the lower end of the staff of the assembly, a power supply unit mounted on the support assembly staff, a hollow mast extending upward from the power supply unit, a servomechanism mounted adjacent the upper end of the mast, a semaphore arm mounted for rotation, and a sensing probe connected by a flexible conductor to the power supply unit and, through the interior of the mast, to the servomechanism. A pair of signal flags, lights or discs are mounted at one end of the semaphore arm. A visual indication of soil moisture content is provided. A system is also disclosed for permitting the moisture sensing device to control distribution of water to the soil. (Sinha-OEIS)
W74-10592

THE FILTRATION FLOW OF PURE WATER THROUGH KAOLIN AND DARCY'S LAW (LES ECOULEMENTS DE FILTRATION DANS LE KAOLIN ET LA LOI DE DARCY),
Ecole National Superieure Agronomique de Toulouse (France).
J. Habib.
Annales Agronomiques, Vol 24, No 6, p 615-637, 1973. 13 fig, 3 tab, 27 ref. English summary.

Descriptors: *Clays, *Permeability, Darcy's Law, Hydraulic gradient, Investigations, *Kaolinite, Porosity.
Identifiers: France.

The water permeability of clays was investigated to determine if it is a constant or variable and if a hydraulic gradient threshold exists below which clay becomes impermeable. Tests on kaolin provided neither confirmation of the existence of such a threshold nor any proof of permeability independent of the hydraulic gradient, since permeability decreases rapidly with the gradient when it is low. A relationship was established between permeability, the porosity of a kaolin and the motor hydraulic gradient. (Merritt-FIRL)
W74-10607

X-RAY DIFFRACTION, ELECTRON MICROSCOPY, ELECTROPHORETIC MOBILITY, AND PH OF SOME STABLE SMECTITE-PROTEIN COMPLEXES,
New Hampshire Univ., Durham.
R. D. Harter, and G. Stotzky.
Soil Science Society of America Proceedings, Vol 37, No 1, p 116-123, January-February 1973. 9 fig, 3 tab, 17 ref. OWRR A-020-NH(9). PHS Grant A1-08767-01.

Descriptors: *Adsorption, *Clay minerals, *Proteins, *Trace elements, Soil chemistry, Sodium, Nutrients, Organic matter, Organic compounds, Hydrogen ion concentration.
Identifiers: *Clay-organic complexes.

Stable clay-protein complexes were studied using X-ray diffractometry, electron microscopy, electrophoretic mobility, and pH measurements. Pepsin was adsorbed to positive edge sites on the smectite, and all other proteins were adsorbed on planar surfaces. Casein, chymotrypsin, lysozyme, and ovomucoid intercalated the H and Na-smectites, and catalase may have intercalated the H-smectite. All proteins, except catalase, intercalated the clays when the weight ratio of protein-to-clay exceeded about 1:5. Catalase did not appear to intercalate the Ca, Al, La, or Th-smectites, even though the ratio of adsorbed protein-to-clay exceeded 1:5. The electrophoretic mobility of the H, Na and Th-smectites became less negative upon adsorption of proteins, indicating a physical or chemical covering of the negative clay surface charge and a flocculation of the complex. When protein was adsorbed by Ca, Al, and La-smectites, they either showed little change or increased in electrophoretic mobility, indicating a tendency for clay tactoids to be broken. The pH of all protein-clay complexes tended to approach neutrality. In the acid clays (H, Al, and Th-emectite), especially, this indicated a cation exchange reaction, since the exchanged inorganic ions would be subsequently removed from the clay. (Knapp-USGS)
W74-10641

DETERMINATION OF CLAY SURFACE ACIDITY BY INFRARED SPECTROSCOPY,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
R. D. Harter, and J. L. Ahlrichs.
Soil Science Society of America Proceedings, Vol 31, p 30-33, January-February 1967. 5 fig, 5 ref. OWRR A-020-NH(4).

Descriptors: *Clay minerals, *Hydrogen ion concentration, *Weathering, *Water chemistry, Organic compounds, Spectroscopy, Infrared radiation, Analytical techniques.

A new and simple method for estimating pH at the surface of colloidal particles uses infrared spectroscopy to determine the effect that proximity to a colloidal surface has on an organic acid molecule. An intensity ratio of the carboxylate to carbonyl infrared absorption bands of organic acids can be used as an indicator of hydrogen ion activity in the compound's environment. Benzoic acid seems to be the best choice for this type of study, since it is not adsorbed by the clay surface in the presence of water. The surface of Wyoming bentonite is about 100 times more acid than the solution at a pH of about 7.0. As the pH decreases, there is a decreasing difference between surface and solution pH. (Knapp-USGS)
W74-10643

EQUIPMENT FOR MEASURING THE WATER PERMEABILITY AS A FUNCTION OF DEGREE OF SATURATION FOR FROST SUSCEPTIBLE SOILS,
Massachusetts Inst. of Tech., Cambridge.
A. E. Z. Wissa, R. T. Martin, and D. Koutsoftas.
Available from NTIS, Springfield, Va 22161 as PB-222 803 Price $7.25 printed copy; $2.25 microfiche. Final Contract Report to Pennsylvania Department of Transportation, December 1972. 100 p, 34 fig, 4 tab, 6 ref.

Descriptors: *Permeameters, *Permeability, *Hydraulic conductivity, *Freezing, Frost, Instrumentation, Frozen soils, Unsaturated flow, Saturated flow.

Water permeability may be measured as a function of degree of saturation on laboratory compacted soil samples. The apparatus can be operated at hydrostatic pressure up to 7 kg per sq cm. The water flow system was designed for continuous uninterrupted flow at high pressure and for manual monitoring of inflow and outflow rates. The turnaround time for a test using only one cell is 3 days. The permeability was reproducible to better than a factor of two which was deemed adequate because the permeability changed several orders of magnitude during any one test. The frost susceptibility of the soils tested was predicted and compared with predictions obtained from CRREL and MASS freezing test procedures. (Knapp-USGS)
W74-10657

TEST OF A NEW MODEL FOR THE KINETICS OF ADSORPTION-DESORPTION PROCESSES,
Utah State Univ., Logan. Dept. of Soils and Biometeorology.
For primary bibliographic entry see Field 5G.
W74-10742

SPRINKLIGATION SPECIAL.
For primary bibliographic entry see Field 3F.
W74-10746

A QUICK-WEIGHING LYSIMETER SYSTEM CHECK,
Agricultural Research Service, Prosser, Wash. Irrigated Agriculture Research and Extension Center.
For primary bibliographic entry see Field 7B.
W74-10749

CALCULATION OF EVAPORATION FROM MEASUREMENTS OF SOIL WATER AND THE SOIL WATER CHARACTERISTIC,
Guelph Univ. (Ontario). School of Engineering.
For primary bibliographic entry see Field 2D.
W74-10758

EFFECT OF SOIL MOISTURE DURING EARLY STAGES OF DEVELOPMENT ON GROWTH AND YIELD OF COTTON PLANTS,
Hebrew Univ., Rehovot (Israel). Faculty of Agriculture.
For primary bibliographic entry see Field 3F.
W74-10761

A COMPARISON OF PHYSICALLY-BASED INFILTRATION EQUATIONS,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
D. Swartzendruber, and E. G. Youngs.
Soil Science, Vol 117, No 3, p 165-167, March, 1974. 1 fig, 10 ref.

Descriptors: *Model studies, *Infiltration, Mathematical studies, *Equations.
Identifiers: *Infiltration equations, Green equation, Ampt equation, *Philip equation.

Three infiltration equations derived from a consideration of the physics of flow through porous media are compared quantitatively over time from zero to infinity. Compared with the Green and Ampt equation, the two-term Philip equation is never more than 15.1 percent higher, while the equation arising out of Philip's linearization analysis is never less than 9.2 percent lower. For practical use these discrepancies may be ignored. Because of its mathematical simplicity and adaptability, the two-term Philip equation, however, would be the preferred choice. (Murphy-FIRL)
W74-10823

SANITARY LANDFILL LEACHATE INTERACTIONS WITH A CARBONATE-ROCK DERIVED SOIL IN CENTRAL PENNSYLVANIA,
Pennsylvania State Univ., University Park. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 5B.
W74-10827

THE EFFECTS OF WATER CONTENT AND DENSITY ON THE ELECTRICAL RESISTIVITY OF SOIL,
Brooklyn Coll., N.Y. Dept. of Geology.
W. D. Jones.
M A Thesis, May 1970. 64 p, 22 fig, 2 tab, 11 ref.

Descriptors: Water chemistry, Soil water, *Resistivity, Pore water, Temperature, Ionization, Soil types, Electrical conductance, *Density.
Identifiers: *Soil water content, *Soil water density, Soil resistance, Partially saturated soil.

Resistivity in a partially saturated soil is a function of temperature, nature of solution, density, water content, and soil type. If the resistivity of water is made constant, the resistivity of a given partially saturated soil will be a function of (1) the cross-sectional area of its pore water and (2) the effective path length between electrodes. These are, in turn, functions of soil water content and density. An increase in salt concentration in the soil will result in a decrease in resistance in the soil. Because resistivity of the solution is a function of ionization, an increase in temperature will also result in increased electrical conductivity. Using original experimental data, an attempt is made to apply the principle as a non-destructive water-content measurement. Because soil resistance is found to be a hyperbolic function of water content, the method loses effectiveness at higher water contents. (Campbell-NWWA)
W74-10829

LAND DRAINAGE OF REDDISH CLAY LOAMS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 3F.
W74-10879

COMPARISON OF DRAINAGE METHODS IN A HEAVY-TEXTURED SOIL,
Ohio Agricultural Research and Development Center, Wooster.
For primary bibliographic entry see Field 3F.
W74-10881

THE AGRICULTURAL USE OF BLACKBURN SEWAGE SLUDGE,
Blackburn County Board Corp. (England).
For primary bibliographic entry see Field 5D.
W74-10895

2H. Lakes

NEW DATA ON CARBONATE FORMATION IN LAKE BALKHASH (NOVYYE DANNYYE O KARBONATOOBRAZOVANII V OZ. BALKHASH),
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
For primary bibliographic entry see Field 2J.
W74-10384

LIMNOLOGY OF LAKE MINNETONKA,
Minnesota Univ., Minneapolis. Limnological Research Center.
For primary bibliographic entry see Field 5C.
W74-10418

MECHANISMS THAT REGULATE GROWTH RATES OF PHYTOPLANKTON IN SHAGAWA LAKE, MINNESOTA,
Minnesota Univ., Minneapolis. Limnological Research Center.
For primary bibliographic entry see Field 5C.
W74-10422

THE EFFECTS OF VARIATIONS IN TURBIDITY ON CYCLES OF PLANKTONIC AND BENTHIC ORGANISMS IN FLOOD CONTROL RESERVOIRS OF NORTHERN MISSISSIPPI,
Mississippi Univ., University. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-10532

A MATHEMATICAL MODEL OF A RIVER PURIFICATION LAKE,
Severn River Authority (England).
For primary bibliographic entry see Field 5C.
W74-10571

PRELIMINARY ESTIMATE OF THE EFFECTS OF IRRIGATED AGRICULTURE ON STREAMFLOW IN THE LAKE BALKHASH BASIN (PREDVARITEL'NAYA OTSENKA VLIYANIYA OROSHAYEMOGO ZEMLEDELIYA NA RECHNOY STOK V BASSEYNE OZ. BALKHASH),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10633

ADSORPTION OF PHOSPHORUS BY LAKE SEDIMENT,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 5C.
W74-10642

ONE-DIMENSIONAL ANALYSIS OF HEAT DISSIPATION IN A SIDEARM OF A COOLING LAKE,
Oak Ridge National Lab., Oak Ridge, Tenn.
For primary bibliographic entry see Field 5B.
W74-10651

HYDROLOGY OF LAKE TARPON NEAR TARPON SPRINGS, FLORIDA,
Geological Survey, Tallahassee, Fla.
J. D. Hunn.
Florida Bureau of Geology Map Series No 60, 1974. 1 sheet, 7 fig, 1 map, 18 ref.

Descriptors: *Surface-groundwater relationships, *Karst hydrology, *Florida, *Lakes, Limnology, Salinity, Tides, Water level fluctuations, Aquifers, Sea water, Tracers.
Identifiers: *Lake Tarpon(Fla).

Lake Tarpon, in northern Pinellas County, Florida, is used principally for boating, fishing, and swimming. The lake was used for water supply only during a 4-year period between March 1926 and May 1930. It has not been used for this purpose since because of the frequent inflow of saline water through a sinkhole on the west side of the lake. To prevent this inflow, an earthen ring dike with four gated culverts was constructed around the sinkhole in May 1969. An outlet canal leading south to Tampa Bay was completed in July 1967. Since the enclosure of the sink, the lake water has become less saline. Before the outlet canal was opened, the only known outlet was Lake Tarpon Sink. The lake water would drain, at irregular intervals, into the sink through the Floridan Aquifer to Tarpon Spring in Spring Bayou, a small tidal estuary about 3 miles northwest of Lake Tarpon Sink in the city of Tarpon Springs. At other times salt water from Spring Bayou would move back through the aquifer, up through the sink, and into Lake Tarpon. The chloride content of water in the lake has ranged from near zero to nearly 5,000 milligrams per liter. The pattern of the water-level fluctuations in Lake Tarpon Sink is similar to the pattern of tidal fluctuations in Spring Bayou in Tarpon Springs. The bottom sediments, which were saturated with water having a high chloride content before the sink was enclosed, are probably the principal source of chloride contamination of the lake water at the present time and probably will continue to contaminate the lake for several years. (Knapp-USGS)
W74-10673

THE WATERS OF MEROM: A STUDY OF LAKE HULEH. III. THE MAJOR CHEMICAL CONSTITUENTS OF A 54 M. CORE,
Yale Univ., New Haven, Conn. Osborn Memorial Labs.
G. E. Hutchinson, and U. M. Cowgill.
Archiv fur Hydrobiologie, Vol 72, No 2, p 145-185, 1973. 15 fig, 5 tab, 14 ref.

Descriptors: *Stratigraphy, *Chemical stratification, *Cores, Chemical properties, History, Titani-

um, Aluminum, Potassium, Phosphorus, Iron, Manganese, Magnesium, Calcium, Strontium, Fluorine, Chlorine, Bromine, Nitrogen, Carbon, Sulfur, Paleolimnology, Hydrogen.
Identifiers: *Israel(Lake Huleh), Silicon, Rubidium, Barium.

The core taken in Lake Huleh showed a sedimentary record of the lower zone in shallow water and an upper zone of lacustrine sediment, implying volcanic damming of the Jordan Valley around 22,000 B.P. Elements studies were: positively correlated with titanium (Al, Si, Ti, K, Rb, Fe, Mn, Mg and Ba), negatively correlated with titanium (Ca, Sr, F), and not significantly correlated with titanium (Cl, Br, combined N, organic C (valid only in lower zone), organic H and S). Chemistry of the lower swamp zone and other shallow water sediments is primarily determined by the amount of organic matter. During the first 10,000 years after formation of the deep lake, sediment, low in organic matter, changed from argillaceous to calcareous. Around 9700 B.P. argilaceous material again became abundant; both types increased to a maximum rate of sedimentation probably about 9000 B.P.; thereafter rate of argillaceous deposition declined far more than the calcareous deposition. Periods of high or low calcareous sedimentation must be due to differences in material eroded into the lake rather than to differences in rate of calcite photosynthetic precipitation. No evidence of any purely internal maturation from oligotrophy to eutrophy is recorded. (Jones-Wisconsin)
W74-10763

RELATIONSHIPS BETWEEN SOIL SALINITY AND THE SALINITY OF APPLIED WATER IN THE SUISUN MARSH OF CALIFORNIA,
California State Dept. of Fish and Game, Sacramento.
For primary bibliographic entry see Field 4A.
W74-10764

OUR GREAT LAKES,
Wisconsin Univ., Madison. Sea Grant College Program.
For primary bibliographic entry see Field 5C.
W74-10784

DIEL OVERTURNING IN LAKES,
CH2M/Hill Redding, Calif.
For primary bibliographic entry see Field 5B.
W74-10797

SOME CHARACTERISTIC FEATURES OF THE BACTERIAL DECOMPOSITION IN SEDIMENTS FROM LAKES AND PONDS IN SOUTHWEST GREENLAND (THE NARSSAQ AREA),
Copenhagen Univ. (Denmark). Inst. of Hygiene.
For primary bibliographic entry see Field 5C.
W74-10799

ADDITIONS TO THE WEST VIRGINIA ICHTHYOFAUNA, WITH COMMENTS ON THE DISTRIBUTION OF OTHER SPECIES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
P. S. Hambrick, C. H. Hocutt, M. T. Masnik, and J. H. Wilson.
Proceedings of the West Virginia Academy of Sciences, Vol 45, No 1, p 58-60, 1973. 7 ref.

Descriptors: *Fish, *West Virginia, *Distribution, Systematics.
Identifiers: East River(W Va), *Notropis galacturus, *Notropis telescopus, Nocomis 1. leptocephalus, *New River(W Va).

An ichthyological investigation of portions of the New (upper Kanawha) River drainage above Bluestone Reservoir, West Virginia was conducted. Included among the collection sites were two localities on the East River sampled by seine. Two minnows, Notropis galacturus and N. telescopus were added to the state's known fish fauna. Distributional records were established for six other species. Some counts and measurements of 20 specimens are given. Species collected at both stations and at station 2 only are listed. The previous record of N. cornutus chrysocephalus from the drainage is from the Greenbrier River where it was believed to have been introduced. N. hudsonius, considered to be introduced into the drainage has spread rapidly throughout the New River and is now established in the lower portions of East River in West Virginia. Capture of Percina crassa roanoka in East River established the second distributional record for this species within the state; one specimen from the Greenbrier River is the only other known collection record in West Virginia. It is recommended that Nocomis 1. leptocephalus, Notropis galacturus, N. telescopus, and Percina crassa roanoka be placed on the West Virginia list of rare and endangered fishes. (Jones-Wisconsin)
W74-10800

EFFECT OF WATER LEVEL FLUCTUATION ON LAKE VEGETATION,
Uppsala Univ. (Sweden).
For primary bibliographic entry see Field 5C.
W74-10801

DIURNAL PRIMARY PRODUCTION PATTERNS IN SEVEN LAKES AND PONDS IN ALBERTA (CANADA),
Calgary Univ. (Alberta). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-10802

VERTICAL ENTRAINMENT INTO THE EPILIMNIA OF STRATIFIED LAKES,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W74-10803

COMPUTER MODELING OF SEDIMENT AND PHOSPHORUS MOVEMENT INTO CANADARAGO LAKE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-10807

OBSERVATIONS ON THE LIMNOLOGY AND PRIMARY PRODUCTION OF A SMALL MAN-MADE LAKE IN THE WEST AFRICAN SAVANNA,
Sussex Univ., Brighton (England). School of Biological Sciences.
For primary bibliographic entry see Field 5C.
W74-10810

DERIVATION OF DAILY PHYTOPLANKTON PRODUCTION ESTIMATES FROM SHORT-TERM EXPERIMENTS IN SOME SHALLOW, EUTROPHIC AUSTRALIAN SALINE LAKES,
Monash Univ., Clayton (Australia). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-10812

2I. Water In Plants

ECOLOGICAL OUTLINE OF THE ARBORETUM AT PETILS AND ADJACENT UNDERGROWTH IN THE VILLE-CARTIER (ILLEET-VILAINE) FOREST,
F. Leduc.
Bot Rhedonica Ser A. 12 p, 129-144, 1972, Illus.
Identifiers: Abies, *Arboretum, Chamaecyparis, Climates, Cupressus, *Ecological studies, *Forests, Juniperus, Larix, Petils, Picea, Pinus, Soil, Thuja, Undergrowth, *France(Ville-Cartier forest).

Ecological conditions were compared in 2 neighboring (100 m) stations in areas of: undergrowth in the Ville-Cartier forest (France); and open prairie on the northern edge of the forest at an altitude of approximately 105 m. The forest is on a plateau not exceeding 110 m. The following conditions were compared: soil composition, permeability, water retention capacity, climatic factors such as rainfall, evaporation, temperature, vegetation. A slight variation in clay content caused temporary water accumulation at the edge of the forest. The presence of abundant dew in the summer at the edge of the forest creates a favorable environment for trees requiring a humid atmosphere. A cold microclimate exists at the soil level, characterized by large temperature ranges. This can be unfavorable to development during the early years. Planting of trees in the arboretum is guided by requirement for soil moisture and climate (temperature and sunlight). Thus, Abies was planted nearest the edge of the forest, in the most humid part, shaded by Picea and Larix. Plants requiring progressively less water and progressively more sunlight are planted farther from the forest: Chamaecyparis, Cupressus, Juniperus, Thuyja, Pinus. These studies demonstrate the ecological modifications involved in the transition from arboretum to forest.--Copyright 1973, Biological Abstracts, Inc.
W74-10421

ON THE THERMOELECTRIC MEASUREMENT OF WATER TRANSFER IN PLANT STEMS,
R. Michler.
Ber Dtsch Bot Ges., Vol 85, No 5/6, p 203-208, 1972. Illus.
Identifiers: *Coffea-Arabica, *Eucalyptus, *Measurement(Thermoelectric), *Orange plants, Stems, *Water transfer(Plants), Water-plant relationships.

The shortcomings of the 'heat impulse' and 'continuous' methods are pointed out, but a combination of the two can yield favorable results. Over compensation and autonomous deviation problems encountered in experiments on Eucalyptus, Coffea arabica and orange plants are discussed. Autonomous deviations vary according to the organism studied and the climate. Blowers are used to circulate the air in the test area and keep a constant temperature.--Copyright 1973, Biological Abstracts, Inc.
W74-10601

WATER REGIMEN AND NITROGEN AND PHOSPHORUS METABOLISM IN PLANTS AFFECTED BY CHLOROCHOLINECHLORIDE (CCC), (IN RUSSIAN),
Akademiya Nauk SSR, Moscow. Inst. of Plant Physiology.
For primary bibliographic entry see Field 3F.
W74-10604

PERIODICITY OF WOOD FORMATION IN SOME TREES OF LOWLAND RAINFOREST IN NIGERIA,
Nigeria Univ., Nsukka. Dept. of Botany.
C. C. Amobi.
Ann Bot (Lond). Vol 37, No 149, p 211-218. 1973. Illus.
Identifiers: Bombax-Buonopozense, Forests, Growth, *Nigeria(Ibadan), *Periodicity(Wood formation), *Rainforests, Seasonal, Trees.

Freshly prepared chlor-zinc-iodide was used to determine the periodicity of wood formation at breast height (144 cm from the ground) in the trunks of some trees growing in the Lowland Rainforest around Ibadan, Nigeria. Wood formation shows seasonal periodicity in the plants studied. The cambial derivatives on the xylem side dif-

ferentiate into wood cells, which at a certain stage of differentiation have abundant cellulose in their secondary walls. The cellulose stains deep blue in chlor-zinc-iodide. This has been used as a criterion for deciding that wood formation has started. When no cells with deep blue staining secondary walls are found the cambium is known to be dormant or quiescent. The resumption of cambial activity is correlated positively with bud break and unfolding of new leaves. In Bombax buonopozense P. Beauv. the relationship may be obscured by local cambial activity induced by injury. Wood formation stops in the trunks either towards the end of the rainy season or at the early part of the dry season. It starts either during the dry season or at the beginning of the rainy season; but the bulk of the wood is formed during the rainy season. Cambial activity stops in most cases before leaf fall. Presence or absence of a starch-free zone and the noding of the vascular rays also give indication of seasonal periodicity in wood formation. Growth rings are periodic and one growth ring is generally formed each year.--Copyright 1973, Biological Abstracts, Inc.
W74-10730

ON THE MECHANISM OF WATER-STRESS-INDUCED STEM DEFORMATION,
Auburn Univ., Ala.
For primary bibliographic entry see Field 3F.
W74-10796

TEMPERATURE AND MOISTURE EFFECTS ON HARDENING OF APPLE ROOTS,
North Central Forest Experiment Station, Grand Rapids, Minn.
For primary bibliographic entry see Field 3F.
W74-10882

2J. Erosion and Sedimentation

EFFECT OF A LOW IMPERMEABLE GROIN ON SHOREZONE GEOMETRY AND TEXTURE, POINT MUGU, CALIFORNIA,
California Univ., Los Angeles. Dept. of Geography.
For primary bibliographic entry see Field 8B.
W74-10358

A FIELD INVESTIGATION OF THE HYDRAULICS AND STABILITY OF CORPUS CHRISTI WATER EXCHANGE PASS, TEXAS,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W74-10361

CURRENT-CONTROLLED ABYSSAL SEDIMENTATION: SAMOAN PASSAGE, EQUATORIAL WEST PACIFIC,
Woods Hole Oceanographic Institution, Mass.
C. D. Hollister, D. A. Johnson, and P. F. Lonsdale.
Journal of Geology, Vol 82, No 3, p 275-300, May 1974. 19 fig, 1 tab, 40 ref.

Descriptors: *Bottom sediments, *Sedimentation, *Pacific Ocean, Sounding, Seismic studies, Sediment transport, Erosion, Deposition(Sediments), Topography, Sampling, Sedimentary structures.
Identifiers: *Samoan Passage(West equatorial Pacific).

Sedimentation in the Samoan Passage of the west equatorial Pacific was studied in 1971, utilizing seismic reflection profiles, bottom photographs, bottom current measurements, bottom water temperature profiles, and sediment cores. Rugged topography with pelagic draping of sediment and infrequent slumping are found on passage walls. Smooth topography and manganese nodules on semi-indurated sediment are related to continued fast (20-50 cm/sec) bottom current flow causing erosion or non-deposition near the passage axis. Compact unfossiliferous zeolitic and ash-rich clay, containing some manganese nodules are related to slow deposition of compact sediment from bottom currents (5-10 cm/sec). Watery abyssal brown clays interbedded with reworked and cross bedded biogenic ooze are related to rapid accumulation of sediment from waning sediment-laden bottom currents in the area north of the passage. The sedimentary record in and around the Passage indicates that relatively intense current flow through the Passage was initiated at some time between the early Eocene and early Oligocene, and continued through most of the Tertiary. Lithologic data suggest significant periodic fluctuations in erosive effects of bottom currents during the Quaternary. (Knapp-USGS)
W74-10364

A RAPID AND ACCURATE METHOD FOR THE ANALYSIS OF CALCIUM CARBONATE IN SMALL SAMPLES,
Amherst Coll., Mass. Dept. of Geology.
B. F. Molnia.
Journal of Sedimentary Petrology, Vol 44, No 2, p 589-590, June 1974. 1 fig, 2 ref.

Descriptors: *Calcium carbonate, *Sedimentology, *Chemical analysis, Filters, Filtration, Laboratory tests.

A method which permits rapid and accurate analysis of calcium carbonate by weight loss-acid digestion is presented. The method permits analysis where only small weight samples are available, such as deep sea cores, but can also be used with larger samples. The technique makes use of a commercially available bacterial filter apparatus and plastic or nitrocellulose filter discs. The error is less than 1%. The number of samples that can be completed in one hour is 15-20. The method works best for very small samples--less than one gram--especially when carbonate content is low. (Knapp-USGS)
W74-10366

A SETTLING TUBE SYSTEM FOR SAND-SIZE ANALYSIS,
Northwestern Univ., Evanston. Dept. of Geological Sciences.
R. J. Gibbs.
Journal of Sedimentary Petrology, Vol 44, No 2, p 583-588, June 1974. 4 fig, 4 ref.

Descriptors: *Settling velocity, *Sedimentology, *Instrumentation, *Particle size, Measurement, Equipment, Data collections, Data processing.
Identifiers: *Settling tubes.

An accurate and precise settling tube is described. Its diameter is 12 cm and the settling distance is 140 cm or more. It has three options for data handling: (1) recording data on a strip chart recorder; (2) recording data on punched paper tape; and (3) utilizing a dedicated minicomputer to handle the data. The pan upon which the sediment accumulates hangs at the bottom of the tube suspended by a wire attached to an electronic balance. The signal output from the electrobalance is a cumulative curve of the weight accumulating as a function of time. (Knapp-USGS)
W74-10367

MEASURES OF PARTICLE ROUNDNESS: A NOTE,
University of New England, Armidale (Australia). Dept. of Geography.
B. Swan.
Journal of Sedimentary Petrology, Vol 44, No 2, p 572-577, June 1974. 3 fig, 3 tab, 23 ref.

Descriptors: *Particle shape, *Sedimentology, Sediments, Sedimentation, *Measurement, Porous media.
Identifiers: *Roundness(Particle shape).

Measures of roundness for individual detrital particles need to be readily applicable and reasonably representative of what they purport to depict. A review of better known methods shows that the use of intercept measurements such as length and width introduce a flatness-sphericity factor into the computation. Curvature measures involving consideration of only the curvature of the sharpest corner understates roundness values. Wadell's method of relating the mean curvature of n corners to the maximum inscribed circle is the most representative. However, the complexity of Wadell's technique may be reduced without serious disadvantage by considering curvature only in regard to the two sharpest corners. It is also postulated that curvature measurements are most usefully made only along a single (the principal) plane. (Knapp-USGS)
W74-10368

DETERMINATION OF AVERAGE GRAIN SPHERICITY IN GRANULAR POROUS MEDIA,
Regional Engineering Coll., Rourkela (India). Dept. of Geology.
B. K. Sahu.
Journal of Sedimentary Petrology, Vol 44, No 2, p 578-582, June 1974. 16 ref.

Descriptors: *Particle shape, *Sedimentology, Sediments, Sedimentation, Measurement, *Porous media.

Average grain sphericity in porous media is a function of fractional porosity and specific surface of the natural porous media as well as of specific spherical surface per unit solid volume if the natural irregular grains are replaced by fictitious spheres of equal volume as those of natural grains. These three variables can be easily measured by thin section or by loose grain methods, but the thin section method is preferred because of its greater accuracy in the whole range of size of interest, its ease and quickness, and its applicability to consolidated as well as unconsolidated granular media. (Knapp-USGS)
W74-10369

THE OCCURRENCE OF GLAUCONITE IN MONTEREY BAY, CALIFORNIA, DIVERSITY, ORIGINS, AND SEDIMENTARY ENVIRONMENTAL SIGNIFICANCE,
California Univ., Santa Cruz. Earth Science Board.
For primary bibliographic entry see Field 2L.
W74-10370

COASTAL PROCESSES AND DEPOSITIONAL PATTERNS ON CAPE ANN, MASSACHUSETTS,
Williams Coll., Williamstown, Mass.
R. W. Cunningham, and W. T. Fox.
Journal of Sedimentary Petrology, Vol 44, No 2, p 522-531, June 1974. 5 fig, 11 ref.

Descriptors: *Sedimentation, *Beaches, *Sediment transport, *Massachusetts, Provenance, Geomorphology, Littoral drift, Waves(Water), Ocean waves, Surf, Refraction(Water waves), Storms.
Identifiers: *Cape Ann(MA).

Four beaches on the southeastern coast of Cape Ann, Massachusetts, were studied to determine sediment source, transport, and depositional patterns. Methods of analysis included beach profiling, sediment sampling, and simulated wave refraction. Wave energy, resulting primarily from northeast storms and the prevailing southwesterlies, concentrates on nearshore island and headland complexes. Due to wave refraction, northeast flowing longshore currents are found at Long, Cape Hedge and Pebbly Beaches. At Good Harbor, longshore drift is predominantly southwestward. The wave energy and refraction patterns determine beach gradients and grain size

distribution. Predominate direction of longshore drift and systematic internal decreases in grain sizes show spits to be the origins of the baymouth barrier beaches. Sand-size sediments are primarily glacial in origin and secondarily a result of erosion of the crystalline headlands. The source of cobbles at Cape Hedge and Pebbly Beaches is a moraine which intersects the shoreline at Cape Hedge. (Knapp-USGS)
W74-10371

DYNAMIC RELATIONSHIP BETWEEN HYDRAULICS AND SEDIMENTATION IN THE ALTAMAHA ESTUARY,
Tulsa Univ., Okla. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W74-10372

EARLY DIAGENESIS: EXPANSIBLE SOIL CLAY-SEA WATER REACTIONS,
State Univ., of New York, Binghamton. Dept. of Geological Sciences.
H. E. Roberson.
Journal of Sedimentary Petrology, Vol 44, No 2, p 441-449, June 1974. 4 fig, 2 tab, 29 ref. NSF Grant GA-22846.

Descriptors: *Expansive clays, *Sea water, *Ion exchange, *Diagenesis, Water chemistry, Sorption, X-ray diffraction, Illite, Montmorillonite, Clay minerals, Mineralogy.

Reactions between two clay-sized vermiculites, one montmorillonite, and one Al-hydroxy-vermiculite, saturated with Ca, were studied for periods up to 10 months. The absorbed cation composition of the clays changes very little after only a few days of contact with sea water. A large proportion (up to 40%) of the interlayer cations become nonexchangeable after prolonged contact with sea water. After contact with sea water for 11 weeks, the ratio of adsorbed Mg to adsorbed K varies from about 1:1 to 5:1 for these four samples, and the amount of adsorbed Na is less than 20% of the total adsorbed cation content for all these samples. X-ray diffraction patterns of sea water immersed samples show that discrete illite does not form as had been expected. Instead, a mixed-layer phase develops. This phase is a random interstratification of illite-like and expansible layers. The 001 diffraction maximum produced by this mixed-layer phase is extremely broad. Burial diagenesis would tend to transform thismixed-layer clay into illite and chlorite. Expansible soil clays delivered to the oceans as part of the suspended load of rivers can adsorb up to 50% or more of all the K and Mg delivered as dissolved load to the oceans. (Knapp-USGS)
W74-10373

STRUDEL SCOUR: A UNIQUE ARCTIC MARINE GEOLOGIC PHENOMENON,
Geological Survey, Menlo Park, Calif.
E. Reimnitz, C. A. Rodeick, and S. C. Wolf.
Journal of Sedimentary Petrology, Vol 44, No 2, p 409-420, June 1974. 11 fig, 8 ref.

Descriptors: *Scour, *Bottom sediments, *Sea ice, *Ice breakup, *Arctic, Erosion, Sedimentation, Sedimentary structures, Sedimentology, Tundra.
Identifiers: *Strudel scour.

When northward-flowing rivers of Alaska inundate extensive areas of sea ice during spring breakup, drainage of freshwater through the ice at holes and cracks (strudel) causes scour depressions more then 4 m deep and as much as 20 m or more across in the sea floor below. These strudel scours and their filled counterparts were studied by side-scan sonar, echosounder, high-resolution seismic gear, diving observations, and sediment sampling. Strudel scours occur within 30 km of river mouths. The scours are most numerous in the inner areas of overflow, as many as 25/km. One strudel scour investigated by diving was surrounded by a ridge, had vertical walls exposing a tundra horizon, and terminated at a gravel layer 4 m below a lagoon floor. Another one terminated at a semiconsolidated layer of silty clay. Both the gravel and silty clay are pre-Holocene deposits. From highly irregular bedding in seismic records it is apparent that virtually all of the Holocene deposits and significant parts of underlying older sediments around river mouths have been reworked by strudel scour. This mixing of sediments by vertical strudel flow causes sediment types to vary greatly over small areas. These new observations add further complicating factors to be considered in the interpretation of shallow-water deposits of cold climates. (Knapp-USGS)
W74-10374

SEDIMENTATION ON GRAVEL OUTWASH FANS, MALASPINA GLACIER FORELAND, ALASKA,
Massachusetts Univ., Amherst. Dept. of Geology and Geography.
T. Gustavson.
Journal of Sedimentary Petrology, Vol 44, No 2, p 374-389, June 1974. 20 fig, 2 tab, 19 ref. ONR-GP Contract N00014-67-A-0230-0001

Descriptors: *Sedimentation, *Glacial drift, *Alluvium, Gravels, Glaciers, *Alaska, Sediment transport, Deposition(Sediments), Sedimentary structures, Stratigraphy, Braiding, Sand bars.
Identifiers: *Malaspina Glacier(AK), Outwash.

Three depositional facies occur on the outwash fans of Fountain Stream and Alder Stream, which drain portions of the Malaspina Glacier along the northeastern Gulf of Alaska. Longitudinal bars are deposited during high-flow stage; they consist of plane-bedded, imbricate, very poorly sorted pebble and cobble gravels. The sediment of the bars decreases in mean size downstream. Some bars terminate in avalanche slip faces of poorly sorted, silty, medium to coarse sand. Paleocurrent directions suggest that stream flow diverges across bar surfaces. Deposition in channels occurs in two morphologically distinct areas, riffles and pools. Sediment deposited in pools consists primarily of ripple cross-laminated, poorly sorted, silty, medium to coarse sand, commonly capped by draped lamination. Ripple crests vary from straight to cuspate. Sediment in riffles consists of gravel laid down under upper flow regime conditions as transverse ribs and stone cells. Both apparently are relict antidune bedforms. During late-stage flow, thin patches of horizontally bedded san are deposited between transverse ribs and adjacent stone-cell borders. The longitudinal bar facies and channel pool facies are common in cutbank sections. The channel riffle facies was not recognized in cutbank sections. Scour pits, commonly observed on some bar surfaces, are produced by currents scouring around grounded ice blocks. Ice-block trails are produced by ice blocks dragged through soft sediment. (Knapp-USGS)
W74-10375

THE ALMA-ATA MUDFLOW OF JULY 15, 1973 (ALMATINSKIY SEL' 15 IYULYA 1973 G.),
Moscow State Univ. (USSR). Problemnaya Laboratoriya Nezhnykh Lavin i Selei.
S. M. Fleyshman, I. A. Mossakovskaya, and V. F. Perov.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 2, p 35-39, March-April 1974. 1 fig, 6 ref.

Descriptors: *Mudflows, Mud, Solifluction, Glaciers.
Identifiers: *USSR(Alma-Ata region), Glacier lakes.

The mudflow which formed in the channel of the Malaya Almatinka River on July 15, 1973 was the thickest mudflow of record in the region of Alma-Ata. The total volume of the mudflow was more than 4.5 million cu m, of which at least 3 million cu m was a mass of mud and rock debris. Maximum surface velocity of the mudflow was estimated at 9-10 m/sec, and maximum discharge at a velocity of 6 m/sec was computed to be 1200 cu m/sec. The volume of the 1973 mudflow was more than twice that of the catastrophic mudflow of 1921, which destroyed a large section of the Kazakh capital. Conditions favoring the formation and main characteristics of the mudflow which passed down the Malaya Almatinka River on July 15, 1973 are analyzed. (Josefson-USGS)
W74-10376

CLAY MINERALS IN SEDIMENTS FROM THE NORTHWESTERN PART OF THE PACIFIC OCEAN (GLINISTYYE MINERALY V OSADKAKH SEVERO-ZAPADNOY CHASTI TIKHOGO OKEANA),
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
N. A. Lisitsyna, B. P. Gradusov, O. A. Dvoretskaya, and N. P. Chizhikova.
Litologiya i Poleznyye Iskopayemyye, No 5, p 5-20, September-October 1973. 7 fig, 24 ref.

Descriptors: *Pacific Ocean, *Sediments, *Clay minerals, Illite, Montmorillonite, Kaolinite, Bottom sediments, Mineralogy, Petrology, Analytical techniques, Sampling, Profiles, Mapping, Zoning.
Identifiers: USSR, Chlorite, Diffractograms.

Fifty bottom-sediment samples were collected along a profile from the shores of Japan to the Marshall Islands and at several stations located southwest of the profile. Principal minerals in the finely dispersed part of the sediments are hydromica, montmorillonite, and mixed-layer formations related to them. These minerals reflect the compositional features of rocks of the source area. They are terrigenous, which is confirmed by the absolute age of hydromicas and feldspars in the sediments. The distribution of clay minerals in recent sediments is zonal: in the littoral zone the montmorillonite content is higher(>50%), while in the pelagic direction the hydromica content is higher (>50% in deep-sea pelagic clays). The effect of diagenetic processes on clay-mineral formation under oceanic conditions is limited by the process of glauconitization of sediments in the littoral and hemipelagic zones. Present areal distribution of clay minerals and lithofacies zones was determined mainly in the Quaternary period and has remained essentially the same for a long period of time, during which sedimentation features in the northwestern part of the Pacific were similar to those of the present. (Josefson-USGS)
W74-10382

URANIUM AND SEDIMENTATION IN THE BLACK AND AZOV SEAS (URAN V PROTSESSE OSADKOOBRAZOVANIYA V CHERNOM I AZOVSKOM MORYAKH),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
G. N. Baturin.
Litologiya i Poleznyye Iskopayemyye, No 5, p 21-32, September-October 1973. 7 fig, 7 tab, 39 ref.

Descriptors: *Sedimentology, *Sedimentation, *Sediments, Clays, Sands, Silts, Sedimentation rates, Suspension, Suspended solids, Suspended load, Dissolved solids, Organic matter, Geologic time, Mapping, Sampling, Cores.
Identifiers: *USSR, *Black Sea, *Sea of Azov, *Uranium, Organic carbon, Ooze.

In rivers of the Azov-Black Sea Basin, uranium migrates mostly in solution. Uranium distribution in sediments of the Sea of Azov is relatively uniform. Its distribution in Black Sea sediments is highly inconsistent, where it generally duplicates the pattern of organic-carbon distribution. The uranium/organic carbon ratio in Black Sea sediments increases as the rates of sedimentation decline. Conditions favorable for uranium concen-

tration are missing in the Sea of Azov, which is a shallow body of water containing sediments frequently disturbed by storms. Principal factors of uranium concentration in deep-sea sediments of the Black Sea are mobility of uranium in river water, high organic-matter content in sediments, relatively complete extraction of uranium from the bottom layer of water by sediments, and low sedimentation rates in the halistatic zones. Uranium content in ooze water of Black Sea sediments reaches 0.000065 g/liter. (Josefson-USGS)
W74-10383

NEW DATA ON CARBONATE FORMATION IN LAKE BALKHASH (NOVYYE DANNYYE O KARBONATOOBRAZOVANII V OZ. BALKHASH),
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
D. S. Turovskiy, and A. B. Sheko.
Litologiya i Poleznyye Iskopayemyye, No 5, p 33-45, September-October 1973. 5 fig, 1 tab, 12 ref.

Descriptors: *Mineralogy, *Carbonates, *Calcite, *Dolomite, *Lake sediments, Sands, Silts, Mud, Lake basins, Lake stages, Water chemistry, Inorganic compounds, Salinity, Analytical techniques, Sampling, Cores, Mapping.
Identifiers: *USSR(Lake Balkhash).

To study mineral formation in sediments of Lake Balkhash, samples were collected from 180 research stations in different parts the lake during field work in 1970. Three hydrochemical characteristics of the lake were distinguished: (1) nonuniformity of mineralization and chemical composition of the water over the area of the lake; (2) distinct metamorphosis of the ionic composition of the water; and (3) presence of carbonate conditions of the magnesium-carbonate type. Fine silty muds are the predominant type of sediment and are found almost everywhere; their carbonate content is 42-60%. A distinctive feature of all Lake Balkhash seiments is their high carbonate content, which increases with the fineness of sediment grains. Authigenic carbonates in the surface layer of Balkhash sediments are represented by calcite and dolomite. Surface sediments in the western part of the lake differ from those in the east. In the west they are represented by gray and light-gray argillaceous and calcareous-argillaceous muds and in the east by calcareous-dolomitic muds. In the east, at a depth of 0.5-1.5 m, these muds are converted to deposits similar in lithologic and mineralogical composition to those of western reaches. Since its formation Lake Balkhash has passed through a number of stages ranging from a freshwater lake to an evaporite basin. While the western part of the lake has always been a freshwater basin, the eastern part exhibits three stages of development (saline basin, freshwater basin, and brackish basin) associated with changes in the salinity of water in this part of the lake. (Josefson-USGS)
W74-10384

SEDIMENT TRANSPORT IN RANDOM WAVES,
Delaware Univ., Newark. Dept. of Civil Engineering.
S. S. Liang, and H. Wang.
Available from NTIS, Springfield, Va 22161 as AD-772 106, Price $4.25 printed copy; $2.25 microfiche. College of Marine Studies Technical Report No 26, December 1973. 104 p, 24 fig, 5 tab, 41 ref, append. ONR Contract N00014-69-A0407.

Descriptors: *Sediment transport, *Surf, *Waves(Water), Bed load, Suspended load, Turbulence, Turbulent flow, Turbulent boundary layers, Simulation analysis, Computer programs, Mathematical models, Winds.

The mechanics of sediment transport under wave action were systematically investigated and the results were extended to a random wave field. The study applies only to regions well beyond the surf zone where the flow field, though irregular in appearance, is still amenable to mathematical expressions in gross terms. The flow field is artificially divided into two zones; the bed layer, and the internal flow region where viscosity can be neglected. The total sediment transport is calculated through matching boundary conditions of the two zones and by adding the bed load and suspended load movements. Computer programs facilitate calculations with overwater wind speed and sediment grain size as the major inputs. Test runs for sample cases indicate that the transport of suspended load dominates the process. (Knapp-USGS)
W74-10390

AN INVESTIGATION OF ELECTRO-OPTICAL TECHNIQUES FOR THE ANALYSIS OF SUSPENDED SEDIMENTS,
Delaware Univ., Newark. Coll. of Marine Studies.
M. L. Salter.
Available from NTIS, Springfield, Va 22161 as AD-773 140, Price $4.75 printed copy; $2.25 microfiche. Technical Report No 28, December 1973. 135 p, 13 fig, 2 tab, 107 ref. 4 append. ONR Contract N00014-69-A-0407.

Descriptors: *Particle size, *Suspended load, *Optical properties, *Electrical properties, Instrumentation, Refractivity, Clay minerals, Sea water, Water analysis.
Identifiers: *Optical scattering.

Electric fields in conjunction with optical scattering are proposed as a tool for the determination of particle size distributions of suspended minerals in water as well as for determining the relative concentrations of the different types of suspended minerals. The effect on light scattering of suspended sediments subjected to an applied electric field was calculated theoretically. The proposed technique depends upon Brownian motion which becomes appreciable for particles under three microns in diameter. (Knapp-USGS)
W74-10407

THE KINEMATICS OF WATER PARTICLE OF BREAKING WAVES WITHIN THE SURF ZONE,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 2E.
W74-10409

EROSION OF THE NORTH SHORE OF LONG ISLAND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
D. S. Davies, E. W. Axelrod, and J. S. O'Connor.
Technical Report No 18, 1973. 101p, 55 fig, 15 tab, 99 ref.

Descriptors: *Beach erosion, *New York, *Erosion control, Surf, Waves(Water), Storms, Coasts, Coastal engineering, Sedimentation, Recreation.
Identifiers: *Long Island(NY), Nassau County(NY), Suffolk County(NY).

The erosion of beaches and bluffs of the north shores of Nassau and Suffolk Counties, Long Island, New York, is described. An inventory is provided of shoreline length, bluffs, dunes, sediment characteristics, summer beach profiles, shore zone vegetation, and manmade structures designed to modify natural processes. The influences of natural processes which continually modify these shoreline features are also described. These processes are sea level changes, winds, tides, littoral transport, and rain runoff. Emphasis is placed upon the major short-term influences of storms, including their frequences and intensities. The extremely expensive attempts of man to inhibit dynamic beach processes are often found to be unpredictable and either ineffective or detrimental. The features of beaches and the historical rates of erosion or accretion at 158 locations are summarized in a Beach Utility Index designed to guide the most rational use of specific shoreline reaches. In addition to estimates of erosion and accretion rates, this utility index summarizes at specific locations the natural barriers to erosion, beach width, sediment grain size of the forebeach and backbeach, and accessibility to the beach. Engineering structures designed to stabilize portions of the beach should not be constructed without detailed knowledge of their influences upon adjacent property. (Knapp-USGS)
W74-10440

DEVELOPMENT AND EROSION HISTORY OF BAYOCEAN SPIT, TILLAMOOK, OREGON,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 2L.
W74-10618

COMPUTER ANALYSIS FOR ACOUSTIC SENSING OF MULTILAYER SEDIMENTS,
New Hampshire Univ., Durham. Dept. of Mechanical Engineering.
A. H. Maguson, G. K. Stewart, and A. K. Newman.
Available from NTIS, Springfield, Va. 22161 as COM-73-11908, Price $2.75 printed copy; $2.25 microfiche. Sea Grant Technical Report UNH-SG-111, July 1973. 6 p, 3 fig, 7 ref. NOAA Sea Grant DC 1-36114.

Descriptors: *Remote sensing, *Mathematical models, *Acoustics, *Bottom sediments, *Sediment-water interfaces, Sonar, Sounding, Seismic studies, Geophysics.

An analytical model proposed for application to the remote acoustic sensing of sediments on the continental shelf uses Green's function as a model for the acoustic response in the liquid layer overlying the sediment. The sediment stratification is represented as a series of discrete layers, each layer being a homogeneous viscoelastic solid. A recurrence relation eliminates potentials in the intermediate solid layers. After applying boundary conditions at the liquid-solid interface, the acoustic response is expressed as an improper integral. The recurrence relation reduces the multilayer problem to a form ideal for solution on the digital computer. The computer analysis of the problem is discussed and compared to previously obtained analytical solutions for the single-layer case. (Knapp-USGS)
W74-10637

ADSORPTION OF PHOSPHORUS BY LAKE SEDIMENT,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 5C.
W74-10642

A RESEARCH HYDRAULIC FLUME FOR MODELING DRIFTING SNOW - DESIGN, CONSTRUCTION AND CALIBRATION,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 2C.
W74-10644

HOLOCENE SEDIMENTARY ENVIRONMENT OF THE ATLANTIC INNER SHELF OFF DELAWARE,
Delaware Univ., Newark. Dept. of Geology.
R. E. Sheridan, C. E. Dill, Jr., and J. C. Kraft.
Geological Society of America Bulletin, Vol 85, No 8, p 1319-1328, August 1974. 13 fig, 7 ref.

Descriptors: *Sedimentation, *Coasts, *Continental shelf, *Delaware, Erosion, Geomorphology, Bottom sediments, Sounding, Stratigraphy, *Atlantic Ocean.

The marine areas immediately off Delaware's Atlantic coast were investigated to determine the geology of the shallow subsurface. High-resolution subbottom profiles were used to identify and map the pre-Holocene erosional surface in Delaware Bay and in the Atlantic Ocean off the Delaware coast. Vibracoring revealed the nature and age of the various seismic layers. Age identifications based on radiocarbon dating, on oxidation zones, and on lithologic characteristics confirm the partial retention of Holocene coastal environments under the inner shelf. The Holocene transgression across the ancient Rehoboth and Indian River lagoons involved erosion through the Holocene lagoonal sediments in some areas, leaving pre-Holocene ridges exposed on the inner-shelf sea floor. Where the ancient lagoonal deposits are thickest over depressions in the pre-Holocene surface, Holocene coastal sediments were retained. The barrier complex related to these earlier Holocene lago ons is projected on a paleographic reconstruction to be at least 12 km east of the present coast. The bottom morphological features of the inner shelf off Delaware are related to dynamic molding of hydraulic bedforms in equilibrium with the present marine environment. (Knapp-USGS)
W74-10669

INDICATIONS OF LONG TERM, TIDAL CONTROL OF NET SAND LOSS OR GAIN BY EUROPEAN COASTS,
Institute of Oceanographic Sciences, Wormley (England).
A. H. Stride.
Estuarine and Coastal Marine Science, Vol 2, No 1, p 27-36, January 1974. 7 fig, 17 ref.

Descriptors: *Sediment transport, *Coasts, *Tides, Littoral drift, Currents(Water), Sedimentary structures, Bed load, Continental shelf, Sand bars, Sand waves, *Europe.

Long sand banks elongated parallel with the main tidal flows are abundant in European seas. Most have one slope steeper than the other. In the majority of these sand banks the direction faced by the steeper slope corresponds with the sense of rotation of the tidal current vectors in relation to the net sand transport direction. This is the result of a lag effect in the picking up and deposition of fine sand through the tidal cycle. Portions of coast which are likely to be subject to a long term net sand loss or gain from the offshore zone may be predicted. (Knapp-USGS)
W74-10672

SHELF SEDIMENTS OFF CHESAPEAKE BAY: 1. GENERAL LITHOLOGY AND COMPOSITION,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 2L.
W74-10678

LITERATURE REVIEW ON RESEARCH STUDY FOR THE DEVELOPMENT OF DREDGED MATERIAL DISPOSAL CRITERIA,
Texas Univ., Dallas. Inst. for Environmental Studies.
For primary bibliographic entry see Field 5B.
W74-10686

THE WATERS OF MEROM: A STUDY OF LAKE HULEH. III. THE MAJOR CHEMICAL CONSTITUENTS OF A 54 M. CORE,
Yale Univ., New Haven, Conn. Osborn Memorial Labs.
For primary bibliographic entry see Field 2H.
W74-10763

SOME CHARACTERISTIC FEATURES OF THE BACTERIAL DECOMPOSITION IN SEDIMENTS FROM LAKES AND PONDS IN SOUTHWEST GREENLAND (THE NARSSAQ AREA),
Copenhagen Univ. (Denmark). Inst. of Hygiene.
For primary bibliographic entry see Field 5C.
W74-10799

COMPUTER MODELING OF SEDIMENT AND PHOSPHORUS MOVEMENT INTO CANADARAGO LAKE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-10807

HYDROSTRATIGRAPHIC UNITS OF SURFICIAL DEPOSITS OF EAST-CENTRAL ILLINOIS,
Illinois Univ., Urbana. Dept. of Geology.
J. W. Vukovich.
M Sc Thesis 1967. 57 p, 13 fig, 2 tab, 25 ref.

Descriptors: Bedrock, Geologic formations, Distribution patterns, Distribution systems, Sediment distribution, Glacial sediments, Gravels, Sands, Till, *Glacial drift, *Groundwater, Geologic history, Drillers logs, *Illinois, *Stratigraphy.
Identifiers: *Mahomet Valley region(Ill), *Hydrostratigraphic units, Glacial deposits, Surficial deposits.

There are six hydrostratigraphic units present in the glacial drift of the Mahomet Valley region of east-central Illinois, which form a sequence of alternating till and sand and gravel units. The lowermost unit, Unit 1, is a thick sand and gravel which is confined to the lower portions of the bedrock channels. It is of Kansan and possibly Nebraskan age, and in some cases may include some sand and gravel of Illinoian age. Unit 2 is a sequence of till and sand. This unit is described as the Illinoian hydrostratigraphic unit. Unit 3 is a silty sand and gravel at the top of the Illinoian which is overlain in several places by the Sangamon soil zone. Unit 4 is the lower Woodfordian till which is a pink, silty till. Unit 5 is the proglacial sand and gravel associated with the upper Woodfordian till, Unit 6, which is exposed at the surface over most of the study area. Through interpretation of the available data it was possible to delineate various sand and gravel zones. It is commonly assumed that the sands and gravels in the glacial drift were scattered and not extensive, but it was found that in Units 3 and 5, the sands and gravels were much more continuous and extend over a larger area than was generally thought. Driller's logs were used in some parts of this study. (Staplin-NWWA)
W74-10852

2K. Chemical Processes

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 9 AND 10, COLORADO RIVER BASIN AND THE GREAT BASIN.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-10353

THE OXIDATION RATE OF SULPHIDE IN SEA WATER,
Goteborg Univ., (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 5B.
W74-10365

EARLY DIAGENESIS: EXPANSIBLE SOIL CLAY-SEA WATER REACTIONS,
State Univ., of New York, Binghamton. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2J.
W74-10373

DISTRIBUTION OF ARSENIC IN DEEP GROUNDWATER OF THE MIDDLE CASPIAN ARTESIAN BASIN (K VOPROSU O RASPREDELENII MYSH'YAKA V GLUBOKIKH PODZEMNYKH VODAKH SREDNEKASPIYSKOGO ARTEZIANSKOGO BASSEYNA),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Prirodnykh Gaza, Moscow (USSR)
For primary bibliographic entry see Field 5B.
W74-10379

RAIOCARBON IN GLACIAL WATER OF THE EL'BRUS REGION (RADIOUGLEROD V LEDNIKOVOY VODE PRIEL'BRUS'YA),
Akademiya Nauk URSR, Kiev. Institut Geokhimii i Fiziki Mineralov.
E. V. Sobotovich, N. N. Kovalyukh, G. N. Bondarenko, and Yu. V. Kuznetsov.
Geokhimiya, No 4, p 618-621, April 1973. 3 fig, 4 ref.

Descriptors: *Carbon radioisotopes, *Radioactive dating, *Age, *Glaciers, *Ice, Melt water, Firn, Rivers, Spring waters, Sampling, Analytical techniques, Instrumentation.
Identifiers: *USSR(El'brus Mountain).

Distribution of C-14 in waters of glacial origin and age of ice were determined in the region of the El'brus Mountain in the Caucasus. The specific activity of glacial samples of meltwater from a glacier crevasse, firn, Terskol River water, relict ice, and Narzan mineral spring water was 22.02, 21.08, 19.80, 13.03 and 0.33 disintegration/min/g of carbon. Radiocarbon age of relict ice was 340 plus or minus 50 years, and that of Narzan mineral spring water, 28,190 plus or minus 420 years. (Josefson-USGS)
W74-10380

PROBLEM OF THE ORIGIN OF HYDROGEN SULFIDE IN NATURAL WATERS (K PROBLEME GENEZISA SEROVODORODA PRIRODNYKH VOD),
Ustredni Ustav Geologicky, Brno (Czechoslovakia).
For primary bibliographic entry see Field 5B.
W74-10381

CLAY MINERALS IN SEDIMENTS FROM THE NORTHWESTERN PART OF THE PACIFIC OCEAN (GLINISTYYE MINERALY V OSADKAKH SEVERO-ZAPADNOY CHASTI TIKHOGO OKEANA),
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
For primary bibliographic entry see Field 2J.
W74-10382

URANIUM AND SEDIMENTATION IN THE BLACK AND AZOV SEAS (URAN V PROTSESSE OSADKOOBRAZOVANIYA V CHERNOM I AZOVSKOM MORYAKH),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 2J.
W74-10383

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 12-16. NORTH PACIFIC SLOPE BASINS, ALASKA, HAWAII, AND OTHER PACIFIC AREAS.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-10616

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PART 7. LOWER MISSISSIPPI RIVER BASIN.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-10617

X-RAY DIFFRACTION, ELECTRON MICROSCOPY, ELECTROPHORETIC MOBILITY, AND PH OF SOME STABLE SMECTITE-PROTEIN COMPLEXES,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 2G.
W74-10641

DETERMINATION OF CLAY SURFACE ACIDITY BY INFRARED SPECTROSCOPY,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W74-10643

CHEMICAL DATA FROM OREGON WATERS, 1972,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 5B.
W74-10652

PRELIMINARY STUDY OF THE QUALITY OF WATER IN THE DRAINAGE AREA OF THE JEMEZ RIVER AND RIO GUADALUPE,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5B.
W74-10658

DIFFUSION-INDUCED INSTABILITY IN MODEL ECOSYSTEMS: ANOTHER POSSIBLE EXPLANATION OF PATCHINESS,
Johns Hopkins Univ., Baltimore. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5B.
W74-10662

ALKALI AND ALKALINE EARTH METALS: DISTRIBUTION AND LOSS IN A HIGH SIERRA NEVADA WATERSHED,
California Inst. of Tech., Pasadena. Div. of Geological and Planetary Sciences.
T. Hinkley.
Geological Society of America Bulletin, Vol 85, No 8, p 1333-1338, August 1974. 2 fig, 7 tab, 14 ref.

Descriptors: *Geochemistry, *Trace elements, Geomorphology, *Alpine, *California, Erosion rates, Weathering, Leaching, Snowpacks, Calcium, Potassium, Cesium, Strontium, *Alkali metals, *Alkaline earth metals.
Identifiers: Rubidium, Barium, *Sierra Nevada(Calif).

The geologic balance and distribution of two families of metals, K-Rb-Cs and Ca-Sr-Ba, were investigated in Thompson Canyon, an undisturbed watershed in the central crest region of the Sierra Nevada of California. In the source rock, two major minerals, microcline and plagioclase, and one minor mineral, biotite, contain most of the mass of these metals. Ca and Sr are being removed from the watershed as stream solute at a higher rate than the alkalies or Ba relative to their abundance in source rocks. Rapid breakdown of plagioclase and exchange mechanisms involving the soil may be responsible for this differential removal. As the snowpack ages in the late spring, it accumulates dusts on its surface, with metal ratios indicating that Thompson Canyon rocks and soils are the source of the dusts. The watershed is being denuded at a rate of less than 1 cm per 1,000 yr, and chemical removal is responsible for the bulk of this rate. (Knapp-USGS)
W74-10667

TEMPERATURE TRANSIENTS IN FLOWING BOREHOLES,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 2F.
W74-10677

MICROWAVE AND SPECTRA OF SOME SULFUR AND NITROGEN COMPOUNDS,
National Aeronautics and Space Administration, Langley Station, Langley Research Center.
For primary bibliographic entry see Field 5A.
W74-10683

EVALUATION OF PROTOTYPE CRUSHED LIMESTONE BARRIERS FOR THE NEUTRALIZATION OF ACIDIC STREAMS,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W74-10693

NEUTRALIZATION OF ACIDIC WASTES BY CRUSHED LIMESTONE,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W74-10694

THE EFFECTS OF WATER CONTENT AND DENSITY ON THE ELECTRICAL RESISTIVITY OF SOIL,
Brooklyn Coll., N.Y. Dept. of Geology.
For primary bibliographic entry see Field 2G.
W74-10829

THE DISTRIBUTION OF MINOR ELEMENTS BETWEEN COEXISTING CALCITE AND DOLOMITE IN THE GASPORT MEMBER OF THE LOCKPORT FORMATION, LOCKPORT, NEW YORK,
New York State Univ., Buffalo.
For primary bibliographic entry see Field 2F.
W74-10861

HAMMAT GADER (ISRAEL): GEOCHEMISTRY OF A MIXED THERMAL SPRING COMPLEX,
Weizmann Inst. of Science, Rehovot (Israel).
For primary bibliographic entry see Field 2F.
W74-10880

ARSENIC-CONTAINING CARBONATED WATERS, OCCURRENCE PECULIARITIES, CHEMICAL COMPOSITION, OCCURRENCE CONDITIONS (MYSH'YAKSODERZHASHCHIYE UGLEKISLYE VODY KAVKOZA (OSOBENNOSTI RASPROSTRANENIYA, KHIMICHESKIY SOSTAV, USLOVIYA FORMIROVANIYA)),
All-Union Scientific Research Inst. of Hydrogeology and Engineering Geology, Moscow (USSR).
S. R. Krainov, G. A. Volkov, N. K. Petrova, and I. V. Baturinskaya.
Geokhimiia, No 2, p 212-227, 1974. 5 fig, 2 tab, 27 ref. English summary.

Descriptors: *Carbonate rocks, *Boron, *Chlorine, Arsenic compounds, Pollutant identification, Chemical reactions.
Identifiers: *Carbonated water, *Arsenic, Chemical mobility, Water enrichment, *USSR(Caucasus region).

The Caucasus is the largest Soviet province of carbonated arsenic-containing water. The water is confined to the youngest structures. It is characterized by high chlorinity and high As/Cl, As/B ratios. The mobility sequence in such water is Cl greater than or equal to As greater than B. The enrichment of carbonated water in arsenic is connected with local thermometamorphic processes of its extraction from rocks. These processes are intensified in the presence of chloride water. Carbonated water enrichment in arsenic is a process superimposed on chloride water and secondary in relation to it. (Sandoski-FIRL)
W74-10884

2L. Estuaries

EFFECT OF A LOW IMPERMEABLE GROIN ON SHOREZONE GEOMETRY AND TEXTURE, POINT MUGU, CALIFORNIA,
California Univ., Los Angeles. Dept. of Geography.
For primary bibliographic entry see Field 8B.
W74-10358

A FIELD INVESTIGATION OF THE HYDRAULICS AND STABILITY OF CORPUS CHRISTI WATER EXCHANGE PASS, TEXAS,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
K. J. Defehr, and R. M. Sorensen.
Available from NTIS, Springfield, Va. 22161 as AD-773 043, Price $4.50 printed copy; $2.25 microfiche. Coastal, Hydraulic and Ocean Engineering Group Report, Contract Report (C.O.E. Report No 170), August 1973. 114 p, 59 fig, 9 tab, 21 ref, 3 append.

Descriptors: *Inlets(Waterways), *Bays, *Sedimentation, *Beach erosion, *Coastal engineering, Streamflow, Tides, Winds, Waves(Water), Surges, Storm surges, *Texas, Gulf of Mexico.
Identifiers: *Corpus Christi Bay(Texas).

Corpus Christi Water Exchange Pass, an artificial tidal inlet connecting the southeast corner of Corpus Christi Bay, Texas with the Gulf of Mexico, was studied to determine the hydraulic characteristics of the inlet, its response to various physical processes, and the nature of its stability. Field work included current measurements, collection and analysis of sediment samples, and measurements of tidal fluctuations in the inlet and Corpus Christi Bay. Tidal data for the Gulf of Mexico and Corpus Christi Bay and weather data were analyzed along with the field data. The inlet has experienced shoaling in the vicinity of the gulf and bay mouths since its completion in August 1972. The bay shoreline has eroded near the inlet. A designed channel bend is partially responsible for erosion of the south bank of the inlet. Wind setup, induced by the passage of cold fronts, influences flow velocities. (Knapp-USGS)
W74-10361

THE OCCURRENCE OF GLAUCONITE IN MONTEREY BAY, CALIFORNIA, DIVERSITY, ORIGINS, AND SEDIMENTARY ENVIRONMENTAL SIGNIFICANCE,
California Univ., Santa Cruz. Earth Science Board.
J. R. Hein, A. O. Allwardt, and G. B. Griggs.
Journal of Sedimentary Petrology, Vol 44, No 2, p 562-571, June 1974. 5 fig, 4 tab, 16 ref.

Descriptors: *Sedimentation, *Bays, *California, *Bottom sediments, *Clay minerals, Sedimentology, Regime, Sediment transport, Provenance, Clays, Mineralogy, Deposition(Sediments), Diagenesis.
Identifiers: *Glauconite, *Monterey Bay(Calif).

Sediment transport, sedimentation rate and the energy due to currents and waves distinguish three distinct environments in Monterey Bay, California: the continental shelf, the continental slope or walls of Monterey Submarine Canyon and the floor of the canyon. Glauconite pellet abundance coupled with its morphologic variability can be used to decipher, and in fact are controlled by, the energy regime of each individual sedimentary environment. Glauconite does not steadily increase in a seaward direction. Pellet morphologies and cleavage studied from scanning electron photomicrographs and X-ray diffraction data suggest several parent materials, even within a single sample. (Knapp-USGS)
W74-10370

COASTAL PROCESSES AND DEPOSITIONAL PATTERNS ON CAPE ANN, MASSACHUSETTS,
Williams Coll., Williamstown, Mass.
For primary bibliographic entry see Field 2J.
W74-10371

DYNAMIC RELATIONSHIP BETWEEN HYDRAULICS AND SEDIMENTATION IN THE ALTAMAHA ESTUARY,
Tulsa Univ., Okla. Dept. of Geology.
G. S. Visher, and J. D. Howard.
Journal of Sedimentary Petrology, Vol 44, No 2, p 502-521, June 1974. 26 fig, 2 tab, 19 ref. NSF Grant GA1635.

Descriptors: *Sedimentation, *Estuaries, *Sedimentary structures, *Georgia, Sand waves, Tides, Tidal streams, Stratigraphy, Saline water intrusion, Saline water-freshwater interfaces, Sediment transport, Ripple marks, Dunes.
Identifiers: *Altamaha Estuary(GA).

Flood and ebb tidal cycles in the Altamaha Estuary produce differing bedforms, sedimentary structures, thicknesses of sedimentary units, and grain size distributions. Differences are the result of changes in bed shear, flow regime, and mechanisms of sediment transport. The salt wedge developed on flood cycles produces a stratified estuary with highest flow velocity below the highest rate of salinity change. This relation results in upper flow regime as predicted by the densimetric Froude relation; trochoidal in phase waves to 2 m in height are formed. Surface waves and internal waves are seen in the salinity stratification. Ebb flow modifies the sand wave surface, and sediment transport is by ripples and dunes in the lower flow regime. Large-scale planar cross-bedding is produced by floodflow; small-scale ripple and dune structures are developed by ebb flow. The estuary is an effective mechanism for size segregation. Suspension populations are removed by both floodflow and ebbflow. There is a net inland transport of suspended sediment with deposition on tidal flats and marshes. A single log-normal source population is fractionated into several differing populations by bedload transport, suspension and recycling during successive tidal cycles. Characteristic log-probability size distributions are developed in different environments. (Knapp-USGS)
W74-10372

SEDIMENT TRANSPORT IN RANDOM WAVES,
Delaware Univ., Newark. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W74-10390

FLUSHING AND WATER QUALITY CHARACTERISTICS OF SMALL-BOAT MARINAS,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-10419

SEA ICE CONDITIONS IN THE COOK INLET, ALASKA DURING THE 1971-72 WINTER,
National Weather Service, Anchorage, Alaska.
For primary bibliographic entry see Field 2C.
W74-10428

OREGON'S NEARSHORE OCEAN,
Oregon State Univ., Corvallis. Marine Advisory Program.
J. E. McCauley.
Available from NTIS, Springfield, Va 22161 as COM-74-10226, price $3.00 printed copy; $2.25 microfiche. Extension Service Sea Grant Report No 16, November 1973. 8 p, 6 fig, 4 photo, 5 ref.

Descriptors: *Oregon, *Coasts, *Environment, *Intertidal areas, Oceans, Productivity, Beaches, Habitats, Water quality, Aquatic habitats.

The relatively straight coastline of Oregon runs in a north-south direction. Headlands and coves interrupt this straight line locally, and rivers cut across it. The coastline is composed of sandy beaches alternating with rocky headlands. The beaches generally lie at the base of bluffs that are seldom high except in southern Oregon. Some coastal bluffs may be separated from the ocean by sand dunes. The beaches are made up of quartz and feldspar sand; they generally lack the shells and shell fragments that occur on beaches in many parts of the world. The shifting sands do not provide a good attachment base for plants and animals. In sharp contrast to the beaches, rock headlands support rich intertidal biological areas. Interplay of physical, chemical, and biological forces makes rocky intertidal regions of the Pacific Northwest among the most productive spots in the world. The sea floor is composed largely of sands similar to those found on the beaches. In the first few miles from the coast these sands become increasingly finer, but within 5 miles of the coast there is almost no mud. Gravel and rocks may be found off the mouths of streams. The coastal waters of the Pacific Northwest are still relatively clean. (Knapp-USGS)
W74-10431

RHODE ISLAND'S OCEAN SANDS: MANAGEMENT GUIDELINES FOR SAND AND GRAVEL EXTRACTION IN STATE WATERS,
Rhode Island Univ., Kingston. Coastal Resources Center.
For primary bibliographic entry see Field 5G.
W74-10437

EROSION OF THE NORTH SHORE OF LONG ISLAND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 2J.
W74-10440

THE NORTH SEA,
Deutsches Hydrographisches Institut, Hamburg (West Germany).
For primary bibliographic entry see Field 5B.
W74-10513

LEGAL ASSURANCES OF ADEQUATE FLOWS OF FRESH WATER INTO TEXAS BAYS AND ESTUARIES TO MAINTAIN PROPER SALINITY LEVELS,
Texas Univ., Austin. School of Law.
For primary bibliographic entry see Field 6E.
W74-10549

DEVELOPMENT AND EROSION HISTORY OF BAYOCEAN SPIT, TILLAMOOK, OREGON,
Oregon State Univ., Corvallis. School of Oceanography.
T. A. Terich, and P. D. Komar.
Available from NTIS, Springfield, Va 22161 as COM-74-10077 Price $4.75 printed copy; $2.25 microfiche. Reference 73-16, September 1973. 145 p, 47 fig, 7 tab, 59 ref, append.

Descriptors: *Beach erosion, *Sand spits, *Oregon, Littoral drift, Coasts, Sand bars, Sediment transport, Sedimentation, Erosion, Jetties, Coastal engineering.
Identifiers: *Boyocean Spit(Oreg), *Tillamook Bay(Ore).

Sever erosion of Bayocean spit, Oregon led to its breaching in 1952 and forcing the abandonment of a deteriorated resort. The erosion appeared to have been initiated by the construction and subsequent lengthening of a north jetty to the Tillamook Bay channel. Rapid sand deposition north of the north jetty indicated that the structure had blocked longshore sand transport, thus depriving the spit of sand and resulting in erosion. Analysis of historical shoreline changes and aerial photographs taken in 1971, 1972, and 1973 show that sand eroded from beaches to the north and to the south of the jetty has been transported and deposited immediately adjacent to both sides of the structure. This symmetrical pattern of erosion and deposition on both sides of the jetty indicates a reversing longshore sand transport with a near-zero net annual drift. The shoreline conditions at Bayocean demonstrate that beach erosion can result from the construction of a jetty transverse to a seasonally reversing longshore sand transport with a near-zero net drift. (Knapp-USGS)
W74-10618

COLLECTION AND ANALYSIS OF REMOTELY SENSED DATA FROM THE RHODE RIVER ESTUARY WATERSHED,
Smithsonian Institution, Edgewater, Md. Chesapeake Bay Center for Environmental Studies.
D. W. Jenkins.
Available from NTIS, Springfield, Va 22161 as N-74-12166 Price $6.75 printed copy; $2.25 microfiche. National Aeronautics and Space Administration Contract Report No NASA CR-62097, 1972. 95 p, 10 fig, 11 tab, 21 ref. Contract No NAS 6-1913.

Descriptors: *Remote sensing, *Estuaries, *Land use, *Chesapeake Bay, Erosion, Turbidity, Farming, Aerial photography, Ecology, Forests, *Maryland.
Identifiers: *Rhode River(Md).

Remote sensing was tested on the watershed of Rhode River, a small sub-estuary of the Chesapeake Bay, as a representative test area for a study over the entire Bay. A broad program of ecological research was already underway on the watershed. A total of 17 overflights were made, thirteen flights at low altitudes (1,200-5,000 feet). The low level flights used natural color and infrared color film. The remaining flights included one at 60,000 feet with natural and infrared color film, a flight at 5,000 feet with film and a multispectral scanner, two flights using a modified AM-AAS-18 MAIRS thermal scanner at 2,000 feet, and an RC-8 sensor with natural color film at 3,000 feet. The most useful flight data for current research proved to be the 9 x 9 inch transparancies of natural color and infrared color film. Both film types were effective for interpreting natural and cultivated vegetation, but natural color was superior for distinguishing species if haze conditions were negligible. Infrared color was best for detecting drainage patterns and evergreen species in winter, while natural color was preferable for interpretation of estuarine conditions. Applications for low level natural color and infrared color film included construction of a drainage map and vegetation map; photo-interpretation of deciduous forest vegetation, salt marsh vegetation, and cultivated fields; and detection of estuarine erosion and siltation patterns. (Knapp-USGS)
W74-10622

REMOTE SENSING REPORT, SAN FRANCISCO BAY AREA, APRIL-JULY 1972. VOLUME I.
National Field Investigations Center-Denver, Colo.
For primary bibliographic entry see Field 5A.
W74-10654

A PRELIMINARY ASSESSMENT OF THE ENVIRONMENTAL VULNERABILITY OF MACHIAS BAY, MAINE TO OIL SUPERTANKERS,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 5C.
W74-10656

DIFFUSION-INDUCED INSTABILITY IN MODEL ECOSYSTEMS: ANOTHER POSSIBLE EXPLANATION OF PATCHINESS,
Johns Hopkins Univ., Baltimore. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5B.
W74-10662

HOLOCENE SEDIMENTARY ENVIRONMENT OF THE ATLANTIC INNER SHELF OFF DELAWARE,
Delaware Univ., Newark. Dept. of Geology.
For primary bibliographic entry see Field 2J.
W74-10669

SEA WATER SYSTEM FOR AQUACULTURE OF ESTUARINE ORGANISMS AT THE SKIDAWAY INSTITUTE OF OCEANOGRAPHY,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5D.
W74-10670

INDICATIONS OF LONG TERM, TIDAL CONTROL OF NET SAND LOSS OR GAIN BY EUROPEAN COASTS,
Institute of Oceanographic Sciences, Wormley (England).
For primary bibliographic entry see Field 2J.
W74-10672

SHELF SEDIMENTS OFF CHESAPEAKE BAY: 1. GENERAL LITHOLOGY AND COMPOSITION,
Virginia Inst. of Marine Science, Gloucester Point.
M. M. Nichols.
Available from NTIS, Springfield, Va 22161 as COM-73-11274 Price $3.00 printed copy; $2.25 microfiche. Special Scientific Report 64, April 1972. 20 p, 2 fig, 8 ref, 3 append.

Descriptors: *Sedimentology, *Sediments, *Marine geology, *Chesapeake Bay, Sands, Sampling, Petrology, Geology.
Identifiers: Inner shelf.

A survey of sedimentary materials and bottom topography for more than 2400 square miles of the inner continental shelf floor north off the Chesapeake Bay entrance delineates several localities which contain concentrations of dark minerals, shell and gravel. Sediments consist of two principal types: (1) fine sand and (2) medium to coarse sand. The fine sand is grey-colored, subrounded, rich in quartz and relatively clean and well sorted. The medium coarse sand is typically ironstained, rich in shell and poorly sorted. The fine sand covers inner parts of the shelf floor whereas medium to coarse sand occurs on isolated ridges of inner parts. (Humphreys-ISWS)
W74-10678

MARINE RESOURCES -- A NATIONAL PERSPECTIVE,
National Oceanic and Atmospheric Administration, Washington, D.C. Office of Coastal Environment.
For primary bibliographic entry see Field 6E.
W74-10732

THE COAST GUARD MARINE ENVIRONMENTAL PROTECTION PROGRAM,
Coast Guard, Washington, D.C. Marine Environmental Protection Div.
For primary bibliographic entry see Field 5G.
W74-10773

REGIONALIZATION IN THE DELAWARE RIVER ESTUARY,
Delaware River Basin Commission, Trenton, N.J. Water Quality Branch.
For primary bibliographic entry see Field 5D.
W74-10775

PHOSPHATES IN SEDIMENTS OF PAMLICO ESTUARY,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5C.
W74-10804

PRIMARY PRODUCTION: FRESHWATER ECOSYSTEMS,
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
For primary bibliographic entry see Field 5C.
W74-10805

NUTRIENT RETENTION IN SALT MARSH PLOTS EXPERIMENTALLY FERTILIZED WITH SEWAGE SLUDGE,
Boston Univ., Woods Hole, Mass. Marine Biological Lab.
For primary bibliographic entry see Field 5C.
W74-10809

OREGON'S SUBMERGED AND SUBMERSIBLE LANDS.
Oregon Advisory Committee to the State Land Board, Salem.
For primary bibliographic entry see Field 6E.
W74-10874

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

ANALYSIS OF A DUAL MODE DESALINATION SYSTEM FOR NAVAL BASES,
Naval Civil Engineering Lab., Port Hueneme, Calif.
E. E. Cooper.
Available from NTIS, Springfield, Va 22161 as AD-764 055, Price $4.50 printed copy; $2.25 microfiche. Technical Note N-1285, May 1973. 48 p, 10 fig, 7 tab, 22 ref.

Descriptors: *Desalination, *Sea water, *Reverse osmosis, *Flash distillation, Descaling, Cost-benefit analysis, Water costs, Water treatment, Waste water treatment.

A dual mode desalination device combines a reverse osmosis unit and a multistage flash distillation unit. The function of the reverse osmosis unit is to remove sufficient amounts of scaling salts from intake seawater to allow scale-free operation of the flash distillation unit at temperatures up to 350 deg F. Substantially higher membrane reliability can be expected if the saline water is pressurized to only 600-800 psi rather than the normal 1100-1500 psi used with seawater. At 600-800 psi, specially blended 'open' cellulose acetate membranes or an ion exchange membrane can reject the necessary percentage of scaling salts with sufficient water flux to feed the flash distillation unit. Thus the dual mode desalination appears technically feasible. An economic evaluation of the dual mode device, however, reveals that the cost of its product water would be higher than that from a conventional 250 deg F flash distillation unit. (Knapp-USGS)
W74-10404

TEST AND EVALUATION OF AN 80,000 GPD REVERSE OSMOSIS SEAWATER DESALINATION PLANT MOUNTED ON AN AMMI PONTOON,
Naval Civil Engineering Lab., Port Hueneme, Calif.
C. K. Smith, and R. S. Chapler.
Available from NTIS, Springfield, Va 22161 as AD-774 473, Price $3.25 printed copy; $2.25 microfiche. Technical Note N-1299, January 1974. 46 p, 19 fig, 2 tab. Project No 64-043.

Descriptors: *Desalination, *Reverse osmosis, *Military aspects, *Sea water, Water treatment, Waste water treatment.

A reverse osmosis seawater desalination plant installed on a pontoon was tested by the Naval Facilities Engineering Command. The major components of the plant tested and evaluated by NCEL were all commercially available at the time the plant was designed and constructed. The individual components used performed satisfactorily in general. The first stage of each system did not contain enough modules to permit operation at seawater temperatures as low as those that exist in many locations. This made it necessary to operate at feed pressures that proved to be marginal for the membrane tube and seal design, and to add an inefficient interstage tank top-off system to avoid staravation of the second stage. Instrumentation with which the locations of modules containing failed membrane tubes could be quickly located was not an integral part of the plant, and diagnosis and repair took far too long to accomplish. With adequate diagnostic instrumentation, the ability to by-pass modules for repair without shutting down the system would have been valuable. (Knapp-USGS)
W74-10405

WATER AND POLITICS IN COASTAL CALIFORNIA - THE DIABLO CANYON EXPERIENCE,
Washington Univ., Seattle. Dept. of Political Science.
For primary bibliographic entry see Field 5D.
W74-10480

FILAMENT WOUND REVERSE OSMOSIS TUBES,
Secretary of the Interior, Washington, D.C. (assignee)
For primary bibliographic entry see Field 8C.
W74-10490

FREEZE PROCESS FOR MAKING FRESH WATER FROM BRINE,
Mitsui Shipbuilding and Engineering Co., Ltd., Tokyo (Japan).
Y. Nagashima, K. Hayashi, M. Inoue, T. Yamazaki, and S. Maeda.
U S Patent No 3,803,860, 5 p, 1 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 927, April 16, 1974.

Descriptors: *Patents, *Desalination, *Water treatment, *Freezing, *Deaeration, Brine, Fresh water, Separation techniques.

Brine is subjected to deaeration and cooling. The cooled brine is fed into a crystallization tank. The brine is contacted with a refrigerant and forms ice particles which are introduced into a washing tower where the ice particles are separated from the brine. The ice particles are then led into a melting tank where they melt into fresh water. The fresh water then passes through a deaerator, and, if necessary, through an adsorber to further remove the refrigerant which might have been retained. (Sinha-OEIS)
W74-10588

COMBINATION CONDENSER-DEGASSER-DEAERATOR FOR A DESALINATION PLANT,
General Electric Co., Bridgeport, Conn.
T. C. Carnavos.
U.S. Patent No 3,803,001, 4 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 921, No 2, p 695, April 9, 1974.

Descriptors: *Patents, *Desalination, *Water treatment, *Vapor compression distillation, Deaeration, Equipment, Condensation, Water vapor.
Identifiers: Degassers.

The combination consists of a vessel having collection and supply chambers, a tube bundle draining into the collection chamber, a distillation collection tank, a nozzle, and conduits. One conduit conducts vapor from the plant over the outside of the tubes, another conduit conducts condensed vapor from around the tubes into the distillate collection tank. A vacuum system is connected to the vessel and plant to remove noncondensibles and uncondensed vapor. Thus vapor from the last stage of a thermal-type desalination plant is condensed into product water. Feedwater is degassed and deaerated in thin films over vertical fluted heat transfer surfaces. (Sinha-OEIS)
W74-10596

A BILL TO AUTHORIZE PROVISIONS OF THE INTERNATIONAL BOUNDARY AND WATER COMMISSION.
House, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10737

3B. Water Yield Improvement

A TWO-DIMENSIONAL WARM FOG MODIFICATION MODEL,
Geomet, Inc., Rockville, Md.
For primary bibliographic entry see Field 2B.
W74-10359

TOWN 'CAPTURES' NATURAL SPRING: CUTS WATER TREATMENT COSTS,
Allen and Hoshall, Memphis, Tenn.
For primary bibliographic entry see Field 5F.
W74-10567

WATER REGIMEN AND NITROGEN AND PHOSPHORUS METABOLISM IN PLANTS AFFECTED BY CHLOROCHOLINECHLORIDE (CCC), (IN RUSSIAN),
Akademiya Nauk SSR, Moscow. Inst. of Plant Physiology.
For primary bibliographic entry see Field 3F.
W74-10604

LABORATORY INVESTIGATION OF ELECTRICAL DISSIPATION OF WARM FOG,
Naval Postgraduate School, Monterey, Calif.
L. B. Herman.
Available from NTIS, Springfield, Va 22161 as AD-775 029 Price $7.75 printed copy; $2.25 microfiche. M Sc Thesis, December 1973. 90 p, 15 fig, 4 tab, 46 ref, 2 append.

Descriptors: *Fog, *Weather modification, *Electrical studies, *Electrical coronas, Cloud physics, Laboratory tests.
Identifiers: Fog clearing.

Fog clearing by electrical means was studied in a 27-cubic-foot fog chamber. Fogging of the chamber was accomplished with a spray nozzle driven by pre-humidified air, producing water droplets ranging from 10 to 75 micrometers. A corona discharge head in the center of the chamber was operated from 0 to 100 kV and measurements of fog conditions were made optically and with coated slides placed at various positions in the chamber. Rapid clearing was caused by the corona discharge. The dominant clearing mechanisms identified were coalescence and pushing of charged droplets to the walls of the chamber; the small size of the chamber precluded determination of which mechanism would be most important in large-scale fog clearing. (Knapp-USGS)
W74-10623

EVALUATION OF A METHOD OF FOG DISPERSAL BY IONIZATION,
California State Div. of Highways, Sacramento. Transportation Lab.
G. R. Bemis, K. O. Pinkerman, and E. C. Shirley.
Available from NTIS, Springfield, Va. 22161 as PB-229 334, Price $4.25 printed copy; $2.25 microfiche. California Division of Highways, Research Report CA-DOT-TL-7128-1-73-23, July 1973. 25 p, 10 fig, 5 ref, append.

Descriptors: *Fog, *Surfactants, *Weather modification, *Ionization, *California, Clouds.
Identifiers: Fog dispersal.

A truck-mounted system for fog dispersal using ionized surfactant was evaluated. The amount of time required for an untreated fog in a chamber to attain a reference visibility (450 ft as estimated by a human observer) was compared to the time required for a treated fog to reach the same reference visibility. The time required to reach 450 ft in the untreated fog was not significantly different than the time required to reach 450 ft with any applications of dispersal treatment. (Knapp-USGS)
W74-10639

A HISTORY OF AIR WEATHER SERVICE WEATHER MODIFICATION, 1965-1973,
H. A. Chary.
Available from NTIS, Springfield, Va. 22161 as AWS-TR-74-247, Price $3.00 printed copy; $2.25 microfiche. Air Force Air Weather Service Technical Report 74-247, June 1974. 25 p, 19 fig, 25 ref.

Descriptors: *Weather modification, *Fog, *Military aspects, *Cloud seeding, Ice fog, Clouds, Meteorology, Reviews, Aircraft, History.
Identifiers: Air Weather Service(USAF).

The history and development of the U. S. Air Force Air Weather Service capabilities in weather modification are reviewed. During the first 8 years of Air Weather Service efforts in weather modification, techniques were developed for cold fog dissipation and for precipitation augmentation. Attacks on the problems of warm and ice fog were less successful. In addition to field testing techniques and materials for possible Air Force and Army use, the Air Weather Service monitors all aspects of weather modification so that present capabilities can be improved and new capabilities can be added. Starting in 1965 with cakes of dry ice suspended from ballons, then testing vented liquid carbon dioxide, vented liquid propane, and silver iodide, AWS developed a ground based cold fog dissipation system. Three such systems, all using vented propane, are now operational. In 1967, AWS undertook airborne dissipation of cold fog by seeding with crushed dry ice. AWS investigations into warm fog dissipation started in 1968 when jet engines were used to clear warm fog temporarily from the Travis AFB runway. Subsequently several tests were run using hygroscopics and helicopter downwash. Precipitation augmentation for drought relief was used twice. AWS participated in such programs in the Philippines and in Texas. AWS's current operational weather modification capabilities include airborne and groundbased cold fog dissipation and precipitation augmentation. (Knapp-USGS)
W74-10675

RADAR IN WEATHER MODIFICATION AND HAIL CONTROL,
M. T. Abshayev, G. V. Vasil'yev, A. Dadali, and M. M. Shamis.
Available from NTIS, Springfield, Va 22161 as JPRS 60573, Price $3.00 printed copy; $2.25 microfiche. Joint Publications Research Service Publication 60573, November 1973. 23 p.

Descriptors: *Radar, *Hail, *Weather modification, Instrumentation, Meteorology, Calibrations, Cloud physics.
Identifiers: *USSR, Hail control.

This translation contains 2 articles on the procedure and apparatus for measuring the attenuation of radar radiation in clouds and precipitation and on problems of radar measurements of hail. (See W74-10688 and W74-10689) (Knapp-USGS)
W74-10687

PROCEDURE AND APPARATUS FOR MEASURING THE ATTENUATION OF RADAR RADIATION IN CLOUDS AND PRECIPITATION,
M. T. Abshayev, Yu. A. Dadali, and M. M. Shamis.
In: Radar in Weather Modification and Hail Control; Joint Publications Research Service Publication 60573, p 1-14, November 1973. 5 fig, 6 ref. (Translation of Vysokogornyy Geofizicheskiy Institut Trudy, No 20, Aktivnyye Vozdeystviya na Gradovyye Protsessy, p 114-126, 1972.)

Descriptors: *Radar, *Hail, *Weather modification, Instrumentation, Meteorology, Calibrations, Cloud physics.
Identifiers: *USSR, Hail control.

Radar may be used for measuring precipitation, the microstructure and water content of clouds, hail and thunderstorm indications and wind. The primary information is obtained by interpretation of such characteristics as the intensity and the Doppler frequency shift of the echo. Procedure and the apparatus used in the USSR for automating the measurements of attenuation as distribution in precipitation and cloud zones are described. (See also W74-10687) (Knapp-USGS)
W74-10688

PROBLEMS OF TECHNICAL REALIZATION OF RADAR MEASUREMENTS OF HAIL,
G. V. Vasil'yev, and M. T. Abshayev.
In: Radar in Weather Modification and Hail Control; Joint Publications Research Service Publication 60573, p 15-23, November 1973. 2 fig, 1 tab, 4 ref. (Translation of Vysokogornyy Geofizicheskiy Institut Trudy, No 21, Fizika Oblakov, p 168-175, 1972.)

Descriptors: *Radar, *Hail, *Weather modification, Instrumentation, Meteorology, Calibrations, Cloud physics.
Identifiers: *USSR, Hail control.

Radar devices used in the USSR for meteorological observations can detect a hail center in a cloud and measure its parameters. These data are necessary for practical cloud modification to prevent hailstorms. The method developed at the High Altitude Geophysics Institute is based on measuring the ratio of the radar reflectivity of a unit volume of the cloud for two wavelengths. (See also W74-10687) (Knapp-USGS)
W74-10689

PRACTICES IN DETENTION OF URBAN STORMWATER RUNOFF,
Poertner (Herbert G.), Bolingbrook, Ill.
For primary bibliographic entry see Field 4A.
W74-10696

REPORT ON THE LAMBOURN VALLEY PILOT SCHEME, 1967-1969,
Thames Conservancy, Reading (England).
For primary bibliographic entry see Field 4B.
W74-10862

CHEMICAL METHOD OF PREVENTING LOSS OF INDUSTRIAL AND FRESH WATERS FROM PONDS, LAKES AND CANALS,
Dow Chemical Co., Tulsa, Okla. Dowell Div.
For primary bibliographic entry see Field 4A.
W74-10883

3C. Use Of Water Of Impaired Quality

LONG-TERM EFFECTS OF IRRIGATION-SALINITY MANAGEMENT ON A VALENCIA ORANGE ORCHARD,
Dept. of Soil Science and Agricultural Engineering. Univ. of California, Riverside.
F. T. Bingham, R. J. Mahler, J. Parra, and L. H. Stolzy.
Soil Science, Vol 117, No 6, p 369-377, 1974. UCAL-WRC-W-124.

Descriptors: *Irrigation effects, *Saline soils, *Oranges, Citrus fruits, *California orchards, Alkaline soils, Root zone, *Salinity, *Salt tolerance, Salts, *Crop production.
Identifiers: *Fruit tree growth.

Fruit production and tree growth characteristics of a Valencia orange orchard are related to equilibrium distribution of salts throughout the root profile in response to uniform applications of irrigation waters varying in salinity and sodicity hazards. Eight years of differential irrigation treatments consisting of basin irrigation with four waters representing low to moderately high salinity, and also with CL and SO4 waters, resulted in soil salinity profiles specific for each water. Both the quantity and quality of oranges have declined under irrigation treatments producing accumulation of soluble salts within the root zone. Specific ion, osmotic, and soil suction effects are discussed in relation to salinity stress. (Snyder-California, Davis)
W74-10420

DOMESTIC WASH WATER RECLAMATION FOR REUSE AS COMMODE WATER SUPPLY USING A FILTRATION--REVERSE OSMOSIS SEPARATION TECHNIQUE,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 5D.
W74-10478

TAILWATER,
T. Milligan.
Irrigation Age, Vol 7, No 5, p 6-7, December, 1972. 4 fig.

Descriptors: *Runoff, *Tailwater, *Return flow, Irrigation practices, Furrow irrigation, Water conservation, Soil conservation, Farm ponds, *Water reuse, *Texas.
Identifiers: Reuse systems.

Economics of tailwater reuse on the Texas plains are discussed. Surveys show that much of the water required for adequate furrow irrigation is wasted at the end of the fields. When 3 to 4 wells contributed to one reuse system, it was found that the system will return as much water as one well will produce. This system thus produced a water savings of 25-30%. Tips on the construction and operation of the reuse system are presented. (Skogerboe-Colorado State)
W74-10760

3D. Conservation In Domestic and Municipal Use

MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS,
Utah State Univ., Logan. Inst. for Social Science Research on Natural Resources.
For primary bibliographic entry see Field 4C.
W74-10351

PROBLEMS OF WATER SUPPLY OF AN INDUSTRIAL TOWN NEAR A WATERSHED (PROBLEMY VODOSNABZHENIYA PRIVODORAZDEL'NOGO PROMYSHLENNOGO GORODA),
Moscow State Univ. (USSR). Kafedra Ekonomicheskoi Geografii.
For primary bibliographic entry see Field 3E.
W74-10378

MANAGEMENT OF URBAN STORM RUNOFF,
Water Resources Engineers, Walnut Creek, Calif., and Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 5D.
W74-10395

A MODEL FOR EVALUATING RUNOFF-QUALITY IN METROPOLITAN MASTER PLANNING,
Water Resources Engineers, Walnut Creek, Calif.; Hydrologic Engineering Center, Davis, Calif.; San Francisco City and County Dept. of Public Works, Calif.
For primary bibliographic entry see Field 5D.
W74-10396

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: ECONOMIC AND ENVIRONMENTAL IMPACTS OF SURFACE RUNOFF DISPOSAL SYSTEMS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6A.
W74-10397

PLANNING AND WASTEWATER MANAGEMENT OF A COMBINED SEWER SYSTEM IN SAN FRANCISCO,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10413

THE MARKET STRUCTURE OF THE SOUTHERN CALIFORNIA WATER INDUSTRY,
Copley International Corp., La Jolla, Calif.
For primary bibliographic entry see Field 6B.
W74-10414

OPTIMIZATION TECHNIQUES FOR MINIMIZATION OF COMBINED SEWER OVERFLOW,
Dept. of Civil Engineering. Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 5D.
W74-10415

HYDROLOGIC ASPECTS OF URBANIZATION (GIDROLOGICHESKIYE ASPEKTY URBANIZATSII),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10631

COUNTY WATER SYSTEM SOLVES DRY AREA PROBLEMS,
Salt Lake County Water Conservancy District, Utah.
For primary bibliographic entry see Field 6D.
W74-10894

3E. Conservation In Industry

PROBLEMS OF WATER SUPPLY OF AN INDUSTRIAL TOWN NEAR A WATERSHED (PROBLEMY VODOSNABZHENIYA PRIVODORAZDEL'NOGO PROMYSHLENNOGO GORODA),
Moscow State Univ. (USSR). Kafedra Ekonomicheskoi Geografii.
N. P. Fedortsov.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 2, p 112-114, March-April 1974. 2 tab, 3 ref.

Descriptors: *Water supply, *Water utilization, *Industrial water, *Cities, *Human population, Water users, Water demand, Water sources, Artesian wells, Groundwater, Watersheds(Basins), Costs.
Identifiers: *USSR(Mordovian ASSR), *Saransk.

The main source of water supply of the town of Saransk in the Mordovian ASSR is groundwater, which occurs in limited amounts. Water consumption by the two major water users in the town--industry and the population--has almost tripled in the last 10 years. Industrial water supply is based on use of groundwater from artesian wells in industrial areas and from the municipal system. In 1971 daily industrial use of water was more than 80% of all water consumed in the town. In 1971 average daily water use per person was 90 liters and, along with public and domestic use, it was 135 liters. By 1975 total water consumption will be 60% greater than in 1971. Measures aimed at rational use of water resources and maximum curtailment of water losses and delivery costs for satisfying the water demands of the population and industry of Saransk include: (1) complete and accurate accountability of water use; (2) centralization of all water withdrawals into a single municipal water-supply system; (3) introduction of a separate water supply for industry, with limitation and subsequent discontinuation of the use of potable groundwater for industrial needs; (4) construction of storage reservoirs within the environs of the town; and (5) more rapid construction of water-treatment facilities. (Josefson-USGS)
W74-10378

THE MARKET STRUCTURE OF THE SOUTHERN CALIFORNIA WATER INDUSTRY,
Copley International Corp., La Jolla, Calif.
For primary bibliographic entry see Field 6B.
W74-10414

AN ION-EXCHANGE PROCESS FOR RECOVERY OF CHROMATE FROM PIGMENT MANUFACTURING,
Mineral Pigments Corp., Beltsville, Md.
For primary bibliographic entry see Field 5D.
W74-10423

STATE OF MARYLAND WASTE OIL RECOVERY AND REUSE PROGRAM,
Environmental Quality Systems, Inc., Rockville Md.
For primary bibliographic entry see Field 5D.
W74-10539

ANAEROBIC - AEROBIC PONDS FOR BEET SUGAR WASTE TREATMENT,
Beet Sugar Development Foundation, Fort Collins, Colo.
For primary bibliographic entry see Field 5D.
W74-10542

TREATMENT AND RECOVERY OF FLUORIDE INDUSTRIAL WASTES,
Grumman Aerospace Corp., Bethpage, N.Y.
For primary bibliographic entry see Field 5D.
W74-10543

IMPROVEMENT OF TREATMENT OF FOOD INDUSTRY WASTE,
RAI Research Corp., Long Island City, N.Y.
For primary bibliographic entry see Field 5D.
W74-10544

WASTEWATER ABATEMENT IN CANNING VEGETABLES BY IQB BLANCHING,
Wisconsin Univ., Madison. Dept. of Food Science.
For primary bibliographic entry see Field 5D.
W74-10545

MISSOURI RIVER HYDROLOGY (STREAMFLOW AND TEMPERATURE)--SIOUX CITY, IOWA TO RULO, NEBRASKA,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 2E.
W74-10659

THE EPA RESEARCH AND DEVELOPMENT PROGRAM FOR ENVIRONMENTAL CONTROLS IN THE POWER INDUSTRY,
Environmental Protection Agency, Washington, D.C. Industrial Pollution Control Section.
For primary bibliographic entry see Field 5G.
W74-10781

SOME ENVIRONMENTAL CONSIDERATIONS IN POWER GENERATION,
Burns and Roe, Inc., Oradell, N.J.
For primary bibliographic entry see Field 5G.
W74-10782

ENERGY SHORTAGE STIMULATES GEOTHERMAL EXPLORATION,
Geosystems Corp., N.Y.
For primary bibliographic entry see Field 4B.
W74-10851

3F. Conservation In Agriculture

WHEAT ROOT ROTS ON UNIRRIGATED LANDS IN UZBEKISTAN, (IN RUSSIAN),
Tashkent Univ. (USSR).
L. E. Gol'dshtein, and G. K. Baigulova.
Mikol Fitopatol. Vol 6 No 6, p 524-528. 1972.
Identifiers: *Fungi, Root rots, Soil moisture, Sprouts, Unirrigated lands, *USSR(Uzbekistan), *Wheat root rod, Crop yield.

Wheat root rot is most severe on unirrigated lands in Uzbekistan (USSR) in fall wheat sowings during the period between sowing and mass sprouting. The development of rot is promoted by an insufficient quantity of soil moisture, by precipitation stimulating the development of the sprouts, and by a prolonged stay of the seeds in the soil. Seven species of fungi were found to cause wheat root rot in unirrigated soil.--Copyright 1973, Biological Abstracts, Inc.
W74-10391

QUALITATIVE FEATURES OF HUMUS IN IRRIGATED CHESTNUT (GREYISH-BROWN) SOILS OF THE KARABAKH STEPPE, (IN RUSSIAN),
N. N. Kasimova, and M. P. Babaev.
Izv Akad Nauk Az Ssr Ser Biol Nauk. 2 p 54-57, 1972, Illus.
Identifiers: *Humus, Irrigated soils, *Soils(Chestnut), Steepes, *USSR(Karabakh Steppe).

Soils irrigated for a long time in the Karabakh steppe showed an accumulation of organic matter, and a high content of humic acids. The composition of the humus in soils where irrigation was recently started was nearly identical with that of virgin soils.--Copyright 1973, Biological Abstracts, Inc.
W74-10425

EROSION CONTROL SAVES SOIL NUTRIENTS,
For primary bibliographic entry see Field 4D.
W74-10456

INCOME DISTRIBUTIONAL CONSEQUENCES OF PUBLICLY PROVIDED IRRIGATION: THE COLUMBIA BASIN PROJECT,
Washington State Univ., Pullman. Dept. of Agricultural Economic.
C. L. Infanger.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 330, $11.25 in paper copy, $2.25 in microfiche. PhD dissertation, 1974. 150 p, 3 fig, 19 tab, 83 ref. OWRR A-060-WASH(1).

Descriptors: Welfare(Econmics), *Income distribution, Economic evaluation, Decision making, Project planning, Irrigation, *Benefits, Cost-benefits analysis, *Columbia River.

It is conventional to base economic evaluation of water resource projects upon determination of economic efficiency. Income redistribution is an important popular objective of such programs. This study contributes to the development of appropriate procedures and information sources necessary to investigate redistributional effects and target efficiency of publicly provided irrigation projects. One of the important forms of public intervention in the U. S. market system is income opportunities programs such as publicly provided irrigation. The distributional consequences of the Columbia Basin Project are examined. When considering all participants, the top 5 percent of the beneficiaries received 30 percent of total benefits while the bottom 25 percent received 1.2 percent. This comparison of the benefit and burden distributions by income class revealed that the redistributional pattern is clearly not in favor of the poor. The distributional consequences of Columbia Basin Project have been found to be unfavorable. This confirms the evaluations of other income opportunities programs--those who benefit are those most capable of realizing the opportunity but least in need of income enhancement. Publicly provided irrigation may be a popular public sector program but fails to reduce the striking inequality of incomes in American Society.
W74-10524

ADJUSTABLE WATER LEVEL AND EROSION CONTROL DEVICE,
H. J. Soileau.
U S Patent No 3,803,851, 4 p, 4 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 925, April 16, 1974.

Descriptors: *Patents, *Irrigation water, *Drainage, *Conservation, *Water levels, Levees, Equipment, Water utilization, Erosion control.

A device controls the level of levee entrapped irrigation water in a given field or area, and it functions in transferring and emptying the water for complete drainage into an adjacent ditch or low level area provided on the other side of the embankment. The structural arrangement consists of a drainage conduit embodying a horizontal drainage pipeline which is adapted to be embedded in a plane beneath the embankment and has an outlet to the ditch. (Sinha-OEIS)
W74-10589

TOWARD THE STRUCTURE OF A PRODUCTION FUNCTION FOR WHEAT YIELDS WITH DATED INPUTS OF IRRIGATION WATER,
Indian Statistical Inst., New Delhi. Planning Unit.
B. S. Minhas, K. S. Parikh, and T. N. Srinivasan.
Water Resources Research, Vol 10, No 3, p 383-393, June 1974. 6 fig, 4 tab, 16 equ, 27 ref.

Descriptors: *Irrigation water, *Irrigation efficiency, Water utilization, *Crop response, *Soil moisture, Analytical techniques, *Wheat, *Alfalfa, Estimating, Yield equations, Ohio, Optimization, Time, Methodology, Evapotranspiration, Water quantity, Plant growth, Water allocation(Policy), Systems analysis.
Identifiers: Production function, Crop yield, Delhi(India).

To date, the interdependence between the rate of water used by plants and the available stocks of moisture in the soil, the temporal interdependence between water use at different time points, and the consequences of these interdependencies for the relationship between time profiles (as well as quantities) of water used by crop plants and yields generally have not been analyzed in a unified framework. Presented is one such framework for the analysis of optimal use of irrigation water. The mathematical form of a water use function, estimated from experimental data, has been used to compute the time profiles of actual water use for wheat in Delhi (India) and alfalfa in Ohio. The estimated time profiles of consumptive use have been used to determine the relationship between wheat yields and dated inputs of water in Delhi. (Bell-Cornell)
W74-10600

WATER REGIMEN AND NITROGEN AND PHOSPHORUS METABOLISM IN PLANTS AFFECTED BY CHLOROCHOLINECHLORIDE (CCC), (IN RUSSIAN),
Akademiya Nauk SSR, Moscow. Inst. of Plant Physiology.
N. S. Petinov, and N. N. Kharanyan.
S-Kh Biol., Vol 7, No 5, p 678-684, 1972. English summary.
Identifiers: Beans, Chloride compounds, *Chlorocholinechloride, *Metabolism, *Nitrogen, Peas, *Phosphorus, Pines, Wheat, Organic compounds(Chlorides).

Plants (bean, peat, spring wheat and pine seedlings) treated with CCC are less sensitive to moisture. After waterings are stopped the water content in leaves of these plants remain rather high, the saturation deficit is small and the concentration of cell sap is lower as compared with the control plants. The retardant effect results in the increase of the water-holding ability of leaves which is connected with the increased amount of the 'tightly bound' water. With the help of H2O18 it is shown that the most favorable water exchange takes place 6 days after the treatment of plants with CCC. The retardant mainly affects protein and nucleic metabolism, inhibiting the decomposition of protein. CCC weakens the absorption of P but stimulates its transport. During the first 3 days after the treatment great inhibition of phosphorylation is observed.--Copyright 1973, Biological Abstracts, Inc.
W74-10604

PRELIMINARY ESTIMATE OF THE EFFECTS OF IRRIGATED AGRICULTURE ON STREAMFLOW IN THE LAKE BALKHASH BASIN (PREDVARITEL'NAYA OTSENKA VLIYANIYA OROSHAYEMOGO ZEMLEDELIYA NA RECHNOY STOK V BASSEYNE OZ. BALKHASH),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10633

OVERLAND FLOW AND ITS VARIABILITY UNDER THE EFFECT OF AGRICULTURAL AND FOREST-IMPROVEMENT PRACTICES (SKLONOVYY STOK I YEGO IZMENENIYE POD VLIYANIYEM AGROTEKHNICHESKIKH I LESOMELIORATIVNYKH MEROPRIYATIY),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4A.
W74-10634

REFLECTANT INDUCED MODIFICATION OF SOYBEAN CANOPY RADIATION BALANCE: I. PRELIMINARY TESTS WITH A KAOLINITE REFLECTANT,
Nebraska Univ., Lincoln. Dept. of Agricultural Climatology.
For primary bibliographic entry see Field 2D.
W74-10668

THE HISTORY OF DRIP IRRIGATION,
California Univ., San Diego.
C. D. Gustafson.
Irrigation Age, Vol 7, No 11, p 4-6, June, 1973. 1 fig.

Descriptors: *Irrigation practices, Surface irrigation, Irrigation, Distribution systems, Irrigation programs, *History.
Identifiers: *Drip irrigation, *Trickle irrigation.

Drip irrigation's history from the first research in Israel to later studies in the United States, Italy, Japan, Australia, and Mexico is reviewed. New methods along with a forecast for the future are outlined. (Skogerboe-Colorado State)
W74-10739

DRIP COUNTRY, U.S.A.,
H. Hutto, Jr.
Irrigation Age, Vol 7, No 11, p 32-25, June, 1973. 34 fig.

Descriptors: *Irrigation practices, *Surface irrigation, Irrigation systems, Application equipment, Distribution systems, Irrigation design.
Identifiers: *Drip irrigation.

A pictorial tour is presented of drip irrigation country, systems, crops, types of emitters, hardware, and techniques peculiar to this type of irrigation. (Skogerboe-Colorado State)
W74-10740

IMPROVED INSTALLATION OF MICROTUBE DRIP IRRIGATION EMITTERS,
Texas A and M Univ., Lubbock. Agricultural Research and Extension Center.
O. Wilke.
Agricultural Engineering, Vol 54, No 5, p 17, May, 1973

Descriptors: *Irrigation, Irrigation practices, Irrigation systems, Surface irrigation, *Tubes.
Identifiers: *Drip irrigation, *Microtubes.

Microtubes as drip irrigation emitters have several distinct advantages -- low cost, good hydraulic characteristics, ease of installation. But if the wall of the microtube is thin, the tube may be pinched partially or totally closed where the tube is inserted into a hole punched in the irrigation lateral pipe. If the microtube is extended from the irrigation pipe, it may be cut by rabbits. As microtube emitter flows are increased, the water stream may travel several feet from the emitter. Foliage may be wetted. As the plastic irrigation pipe twists due to contraction, the stream direction may change, altering the soil area wetted by the emitter. These problems can be eliminated at negligible cost by sliding a short piece of black polyethylene tubing over the outlet end of the microtube. (Skogerboe-Colorado State)
W74-10741

BIG GUNS AND BLACK, WAXY GUMBO,
T. Milligan.
Irrigation Age, Vol 7, No 6, p 26-27, January, 1973. 1 fig.

Descriptors: *Irrigation practices, *Sprinkler irrigation, Crop response, Crop production, *Alfalfa, *Texas.

A farmer and a rancher in the midst of the Blackland heavy clay soil area, near Dallas, Texas, are using supplemental irrigation using big gun sprinklers. The sprinklers deliver 4-1/2 inches of water in 20 hours on 10 acres. Five cuttings of hay were produced in one summer, averaging 1000 bales per cutting. (Skogerboe-Colorado State)
W74-10744

GATED PIPE AND SIPHON TUBES.
Irrigation Age, Vol 7, No 8, p 30-31, 34, March, 1973. 1 fig.

Descriptors: Irrigation practices, *Furrow irrigation, Application equipment, Surface irrigation, Irrigation systems, *Siphons, *Tubes, *Nebraska, *Pipes, Corn(Field).
Identifiers: *Gated pipes.

A comparison is presented of a Nebraska farmer's experience with gated pipe and siphon tubes. The gated pipe saved both water and labor. (Skogerboe-Colorado State)
W74-10745

SPRINKLIGATION SPECIAL.
Irrigation Age, Vol 7, No 6, p 17-19, January, 1973. 2 fig, 1 tab.

Descriptors: *Irrigation, *Irrigation practices, *Sprinkler irrigation, Surface irrigation, Irrigation systems, *Soil types, *Loam, *Sands.

On many soil types, sprinkler irrigation is the only proper choice, e.g. deep sands, sandy loams, fields of complex and undulating topography and soils whose productivity would be permanently impaired by or made costly to restore if leveled for gravity. And, sprinklers open the way to 'spoon' feed water and 'spoon' feed plant nutrients; and often get more production per unit of water and nutrients applied. (Skogerboe-Colorado State)
W74-10746

DRIP IRRIGATION BIG SUCCESS AT BUENA VISTA WINERY.
Irrigation Journal, Vol 22, No 6, p 7-8, November-December, 1972. 3 fig.

Descriptors: *Irrigation practices, *Surface irrigation, Application equipment, Surface irrigation, Irrigation systems, *California.
Identifiers: *Sonoma(Calif), *Drip irrigation, *Wineries.

A large drip irrigation system used at the Buena Vista Vineyards is described. The system seems to be very successful in supplying the needed water and also cuts both water use and cultivation costs. (Skogerboe-Colorado State)
W74-10747

SHOULD I IRRIGATE ONLY EVERY OTHER ROW,
T. Milligan.
Irrigation Age, Vol 7, No 7, p 16-18, March 1973. 1 fig, 2 tab.

Descriptors: *Irrigation practices, *Furrow irrigation, Surface irrigation, Water conservation, Crop response, Crop production, *Nebraska, *Corn(Field).

Tests on irrigating every other furrow have been conducted at the University of Nebraska. The field getting water applied down every furrow was irrigated six times, used 14.9 inches of irrigation water to go with the 11.8 inches of rain during the growing season. That plot made 170 bushels of corn per acre. Where the same every other furrow was irrigated, the same number of times, 10.7 inches of water was applied and 161 bushels were harvested per acre. The every other furrow (alternated) used 10.5 inches of irrigation water and yielded 163 bushels an acre. (Skogerboe-Colorado State)
W74-10748

SOIL AND WATER CONSERVATION RESEARCH: CHALLENGE FOR THE 70'S,
Agricultural Research Service, Beltsville, Md. Soil and Water Conservation Research Div.
J. van Schilfgaarde.
Agricultural Engineering, Vol 53, No 4, p 17, 20, April 1972.

Descriptors: *Conservation, *Soil conservation, *Water conservation, *Research priorities, Nitrates, Phosphates, Drainage, *Agriculture.

Research needed in agriculture during the 1970's is described. Work already done is presented and needed research is outlined. (Skogerboe-Colorado State)
W74-10750

CLASS 'A' PAN AND IRRIGATION SCHEDULING,
T. Milligan.
Irrigation Age, Vol 7, No 10, p 12-17, May, 1973. 5 fig, 2 tab.

Descriptors: Irrigation, Irrigation practices, Irrigation design, Application equipment, Distribution systems, *Scheduling, *Evaporation pans, Methodology.
Identifiers: *Irrigation scheduling.

A method is presented whereby a Class A evaporation pan can be used to help schedule irrigation. The method was developed to be used by non-technical personnel. While this method is not as exotic and complete as those using a computer, it is an economical working aid to the farmers. (Skogerboe-Colorado State)
W74-10751

DRIP IRRIGATION: TEXAS STYLE,
L. New.
Irrigation Age, Vol 7, No 11, p 19-21, 23, June, 1973. 1 fig, 1 tab.

Descriptors: *Irrigation practices, *Surface irrigation, Irrigation systems, Application equipment, Distribution systems, Irrigation design, *Texas, Orchards, Greenhouses, Crops.
Identifiers: *Drip irrigation.

Drip irrigated field tests on West Texas orchards, South Plains greenhouses and Dawson County row crops have recently been initiated. Preliminary results of these tests are most favorable and Texas farmers seem pleased at the prospect of this relatively new form of irrigation. (Skogerboe-Colorado State)
W74-10752

REDUCED TILLAGE FARMING: SAVES WATER AND DOLLARS,
Irrigation Age, Vol 7, No 3, p 12-14, October, 1972. 2 fig.

Descriptors: *Cultivation, *Farm management Soil management, Conservation, Crop production *Land management, Crop response, *Planting management, *Soil conservation, Irrigation.
Identifiers: *Tillage(Minimum).

Minimum tillage farming, once thought only useful in dryland areas, is now becoming popular under a wide variety of irrigation systems. The main advantages are: moisture conservation, lower production cost, higher profits, reduced erosion, better seedling survival, improved soil structure, increased land opportunity, wildlife habitat, and lower labor requirements. (Skogerboe-Colorado State)
W74-10753

CENTER PIVOTS ON ALFALFA.
Irrigation Age, Vol 7, No 6, p 28-29, 60-61, January, 1973. 3 fig.

Descriptors: *Irrigation systems, *Sprinkler irrigation, *Surface irrigation, Irrigation practices, Application equipment, *Corn(Field), *Alfalfa, *Oklahoma.
Identifiers: *Center pivots.

Center pivot sprinklers are being used in northwestern Oklahoma to transform sparsely vegetated range land into productive alfalfa and corn fields. The 5,340 acres are divided into 29 circles ranging in size from 160 to 240 acres. The soil types range from deep sand to sandy clay. The wide variation in application rates possible with the sprinkler systems makes them ideally suited for the project. Water for the system is provided by a series of wells. (Skogerboe-Colorado State)
W74-10754

SOLID SET ON PECANS.
Irrigation Age, Vol 7, No 6, p 30-32, January, 1973. 6 fig.

Descriptors: *Irrigation systems, *Sprinkler irrigation, Surface irrigation, Irrigation practices, Application equipment, Supplemental irrigation, *Pecans.
Identifiers: *Solid set sprinkler systems.

A buried solid set sprinkler system is being used on a large pecan orchard. The Buckner sprinkler heads used are 1/8-inch, low trajectory with an angle of 20 degrees so as to keep the water under the trees as much as possible. Low foliage on the trees is kept pruned off to facilitate a more even water pattern and uniform wetting of the area around the tree. Eighteen sprinklers take care of an acre, and each acre has 36 trees. The manually operated system on phase one will cover the 1,027 acres in 12 days. Each set is for 24 hours. Water is supplied from river pumps which pump into a 300,000 gallon reservoir. Two turbine pumps rated at 5,600 gpm push the water from the river through a 22-inch pipeline to the reservoir. Three 8-inch horizontal centrifugal pumps are used to bring water out of the storage tank under a pressure of about 75 pounds. The sprinklers are operated at 55 to 60 pounds psi. (Skogerboe-Colorado State)
W74-10755

UNCONVENTIONAL FURROW IRRIGATION.
Irrigation Age, Vol 7, No 8, p 36-37, March, 1973. 1 fig.

Descriptors: *Irrigation practices, *Furrow irrigation, Automation, Surface irrigation, Application equipment, Irrigation systems, *Texas, *Cotton.
Identifiers: El Paso(Tex).

In recent years, Texas A and M scientists at El Paso developed a variable row spacing system for irrigated cotton that greatly reduced water needs. The system involved the use of 80-inch spaced furrows separated by wide, flat beds. The space between the rows of cotton on each side of the furrow was 26 inches. This system reduced the size of seasonal irrigations from six to three inches per application and lowered total water use by 54 percent compared to 40-inch rows watered in every furrow. (Skogerboe-Colorado State)
W74-10756

AUTOMATIC IRRIGATION SUPPLY SEQUENCING VALVE,
Mauna Kea Sugar Co., Hilo, Hawaii.
J. F. Cykler.
Agricultural Engineering, Vol 53, No 1, p 21, January, 1972. 2 fig.

Descriptors: *Irrigation practices, Surface irrigation, *Sprinkler irrigation, Hydraulic valves, *Automatic control.

A valve is described that improves the man-day performance of irrigation crews handling a number of 1500 gpm automatic overhead irrigators. It is a primary directional flow control for a zone of irrigation where water could be switched to either of two quick-coupled or buried irrigation pipe lines. This valve assembly is self-contained with its own power supply and can be either portable or fixed. The assembly consists of a 6-inch DeZurik 3-way water valve fitted with a handle and a set screw to float the valve plug. The action of the valve, through its 90 degree arc of operation, is accomplished by a 4 inch by 12 inch double-acting hydraulic cylinder fitted with the usual swivel brackets and rod end clevises. The upstream water pressure provides the driving force to power the piston. A 100 mesh line filter prevents trash from plugging the small orifices in the solenoid water valves. (Skogerboe-Colorado State)
W74-10757

AUTOMATED FURROW IRRIGATION,
T. Milligan.
Irrigation Age, Vol 7, No 8, p 24-25, March, 1973. 1 fig.

Descriptors: *Irrigation practices, *Furrow irrigation, *Automation, Surface irrigation, Application equipment., Irrigation systems, *Valves.

Automation of the gated pipe system was made possible by an 18-inch air actuated valve. The valve connects to a riser on a buried pipeline or a tee in an above-ground supply line. Gated pipe is connected to the valve to distribute the water down the furrows. The valve may be six or eight inches in diameter, depending on the size of the gated pipe. The nylon-reinforced butyl rubber diaphragm is inflated to stop the water flow through the valve. The valve will fully close when one psi pressure more than the pressure in the supply pipeline is applied. For instance if the water pressure in the mainline is three psi, four psi air pressure from the compressor was needed to completely shut off the water. It is estimated that a full quarter-section of land can be equipped for automated furrow irrigation for about the same money it takes to equip a quarter section with center-pivot sprinkler...$16,000 to $20,000. (Skogerboe-Colorado State)
W74-10759

EFFECT OF SOIL MOISTURE DURING EARLY STAGES OF DEVELOPMENT ON GROWTH AND YIELD OF COTTON PLANTS,
Hebrew Univ., Rehovot (Israel). Faculty of Agriculture.
A. Marani, and D. Levi.
Agronomy Journal, Vol 65, No 4, p 637-641, July-August, 1973. 7 fig, 2 tab, 11 ref.

Descriptors: *Irrigation, *Irrigation practices, *Cotton, Crop response, *Soil moisture, Crop production, Tension.
Identifiers: *Israel.

The effect of three irrigation treatments on the vegetative development of two cultivars of upland cotton was studied in two experiments conducted under different climatic conditions. The treatments differed until the middle of flowering and were designated as L (no irrigation), M (regular), and H (early and excessive irrigation). From mid-flowering onwards all plots were irrigated regularly. In both experiments, treatment L resulted in a slower growth rate, smaller plants, fewer nodes and fruiting branches, and smaller leaf area index (LAI) and dry matter (DM) weight throughout the season. Small differences were found between the effects of treatments M and H. No excessive vegetation development was observed in this study. The highest rates of DM production were associated with LAI values between 2.0 and 3.0. A close relationship was found between lint yield, DM production and leaf area duration. (Skogerboe-Colorado State)
W74-10761

SURFACE RUNOFF LOSSES OF SOLUBLE NITROGEN AND PHOSPHORUS UNDER TWO SYSTEMS OF SOIL MANAGEMENT,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-10789

ON THE MECHANISM OF WATER-STRESS-INDUCED STEM DEFORMATION,
Auburn Univ., Ala.
F. J. Molz, and B. Klepper.
Agron J. Vol 65 No 2 p 304-306. 1973. Illus.
Identifiers: *Cotton, Gossypium-Hirsutum, *Stem deformation(Plants), *Moisture stress, Xylem.

Experiments were performed to determine where and to what extent stem deformation occurs in the tissue of water-stressed cotton (Gossypium hirsutum L.) plants. Such knowledge is necessary if stem contraction is ever to be used as an index of plant water status. Tension in the xylem of cotton stems was released by severing under water, and portions of stem xylem were subjected to positive hydrostatic pressures in a pressure chamber. The results indicate that the mature xylem of a cotton stem is a rigid material that undergoes negligible elastic deformation in the radial direction when subjected to a hydrostatic stress in the vicinity of 10-15 bars. Any measurable deformation in a water-stressed stem is due almost entirely to dehydration of the living cells found in the phloem and related tissues. These conclusions indicate that it will not be possible to develop a simple relationship between stem diameter changes and plant water status such that a measurement of stem shrinkage can be used to estimate xylem water potential directly. The relationship is complicated by the thickness and water relations of the outer living stem cells.--Copyright 1973, Biological Abstracts, Inc.
W74-10796

ESTIMATING TRANSPIRATION RESISTANCE,
Kansas State Univ., Manhattan. Dept. of Agronomy.
For primary bibliographic entry see Field 2D.
W74-10806

MEASUREMENT OF LEAF WATER POTENTIAL IN WHEAT WITH A PRESSURE CHAMBER,
Agricultural Research Service, Mandan, N. Dak. Northern Great Plains Research Center.
A. B. Frank, and D. G. Harris.
Agron J. Vol 65, No 2, p 334-335. 1973. Illus
Identifiers: *Leaf-water potential, Measurement, *Pressure chambers, Triticum-Aestivum, *Wheat, *Growth rates, Leaves.

Estimates of leaf water potential obtained with a pressure chamber and with thermocouple psychrometers were compared for wheat (Triticum aestivum L.) leaves of late tillering and early heading stages of growth. The methods were linearly related for both stages of growth, but the equations were different. The pressure chamber required a separate calibration for estimating water potential of leaves from 2 locations on wheat plants.--Copyright 1973, Biological Abstracts, Inc.
W74-10811

LAND DRAINAGE OF REDDISH CLAY LOAMS,
Wisconsin Univ., Madison.
L. R. Massie, and G. H. Tenpas.
Paper No 72-728 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972, Chicago, Illinois. 8 p, 1 fig, 5 tab.

Descriptors: *Drainage, Surface drainage, Subsurface drainage, Tile drainage, Crop response, Soil water, Drainage engineering, Soil water movement, *Loam, *Forages, *Clays, Fertilization, *Wisconsin.

An excellent forage crop can be established and maintained on the reddish clay soils in Northern Wisconsin under the following conditions: A drainage system (surface and/or tile) is installed on the field. Soil acidity and fertility levels are maintained in the acceptable range for legumes. Variety selection is used to overcome any situations where complete water control cannot be achieved. The old idea of a rotation is abandoned with the legume being plowed down only to balance the small grain and forage acreages. (Skogerboe-Colorado State)
W74-10879

COMPARISON OF DRAINAGE METHODS IN A HEAVY-TEXTURED SOIL,
Ohio Agricultural Research and Development Center, Wooster.
G. O. Schwab, N. R. Fausey, and D. W. Michener.
Paper No 72-727 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972, Chicago, Illinois. 5 p, 1 tab, 6 ref.

Descriptors: *Drainage, Surface drainage, Subsurface drainage, Tile drainage, Crop response, Soil water, Drainage engineering, Soil water movement.

Corn, oat, and soybean yields from surface drained, tile drained, and a combination of tiled and surface drained plots in northern Ohio were obtained over a 10-year period. Both conventional tillage and no tillage practices were included. Rainfall plus irrigation and drainage flow effects on yields were studied by linear regression techniques. (Skogerboe-Colorado State)
W74-10881

TEMPERATURE AND MOISTURE EFFECTS ON HARDENING OF APPLE ROOTS,
North Central Forest Experiment Station, Grand Rapids, Minn.
D. K. Wildung, C. J. Weiser, and H. M. Pellett.
Hortscience. Vol 8, No 1, p 53-55, 1973. Illus.
Identifiers: *Apple roots, Malus-robusta, Moisture, Rainfall, Season, *Root hydration, Root systems, *Soil temperature, Root hardening.

Roots of 'Malling (M) 26' and 'Malus robusta (MR) 5' were less hardy than stems in winter; hardened more slowly in fall; and dehardened later in spring. In 1967 roots were hardier than in 1968, despite slightly higher soil temperatures. This difference in hardiness was associated with much less rainfall in 1967 leading to a lower level of root hydration. While overall soil temperature-hardiness relationships were unclear, short-term changes in root hardiness were correlated with soil temperature during the preceding week. Hardening in apple roots appeared to be influenced by soil temperature and level of root hydration.Copyright 1973, Biological Abstracts, Inc.
W74-10882

THE AGRICULTURAL USE OF BLACKBURN SEWAGE SLUDGE,
Blackburn County Board Corp. (England).
For primary bibliographic entry see Field 5D.
W74-10895

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

WATER RESOURCES INVESTIGATIONS IN ARIZONA, 1973.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-10362

PROBLEMS OF WATER SUPPLY OF AN INDUSTRIAL TOWN NEAR A WATERSHED (PROBLEMY VODOSNABZHENIYA PRIVODORAZDEL'NOGO PROMYSHLENNOGO GORODA),
Moscow State Univ. (USSR). Kafedra Ekonomicheskoi Geografii.
For primary bibliographic entry see Field 3E.
W74-10378

INTERPRETATION OF LAND USE AND STREAM ORDER, PAWNEE RIVER BASIN, KANSAS.
Kansas Univ. Center for Research, Inc., Lawrence.
Available from NTIS, Springfield, Va. 22161 as N73-31310, Price $3.00 printed copy; $2.25 microfiche. ERTS Detailed Image Interpretation Report No 2264-8, September 1973. 3 p, 2 fig, 1 ref. NASA Contract NAS-5-21822.

Descriptors: *Remote sensing, *Land use, *Drainage patterns(Geologic), *Kansas, Crops, Geomorphology, Farms, Data collections, Grasslands, Water resources, Mapping.
Identifiers: *Pawnee River basin(Kans).

Land use and stream orders were mapped from ERTS-1 imagery covering the Pawnee River Basin. Total area of the basin, irrigated and dry land crop area, and rangeland area were determined. The stream order of the basin was calculated by the Strahler method and provided more detail than is available on the comparable 1:250,000 sheets. ERTS-1 are useful for mapping and mensuration of data relating to permanence of ground cover types and the extent of irrigation. (Knapp-USGS)
W74-10430

A RESERVOIR MODEL ALTERNATIVE TO THE UNIT HYDROGRAPH FOR FLOOD ESTIMATION,
Transport and Road Research Lab., Crowthorne (England).
D. Fiddes.
Available from NTIS, Springfield, Va 22161 as PB-222 047, Price $3.75 printed copy; $2.25 microfiche. Report LR 554, 1973. 33 p, 5 fig, 1 plate, 7 tab, 11 ref, 1 append.

Descriptors: *Rainfall-runoff relationships, *Storm runoff, *Storage, *Unit hydrographs, Computer programs, Mathematical models, *Africa, Water storage, Infiltration, Overland flow, Urban hydrology, Urban runoff.
Identifiers: Kenya, Uganda, Nairobi.

A simple nonlinear reservoir catchment model is described and compared to the unit hydrograph. Both models are calibrated using data from a Kenyan catchment. The new model requires less data for calibration and is capable of more accurate flood prediction. A network of representative catchments was instrumented throughout Kenya and Uganda to provide the necessary data for developing improved flood design methods for road engineers in East Africa. None of the catchments within the rural network has yet provided sufficient data to calibrate the model but records from the Bernhard catchment which is a catchment installed at an earlier data for a similar investigation into urban flooding in Nairobi, Kenya were used. Although within an urban area, this catchment behaves in many respects in a similar way to a rural catchment. (Knapp-USGS)
W74-10432

CHANNEL NETWORK SIMULATIONS,
IBM Watson Research Center, Yorktown Heights, N.Y.
J. S. Smart.
Available from NTIS, Springfield, Va 22161 as AD-775 248, Price $3.00 printed copy; $2.25 microfiche. Final Contract Report, February 1974. 9 p, 11 ref. Contract ONR N00014-70-C-0188.

Descriptors: *Simulation analysis, *Drainage patterns(Geologic), Stochastic processes, Hortons law, *Drainage density, Geologic control, Tributaries, Geomorphology, Topography, Mathematical models, *Channel morphology.

Random-walk models were developed to simulate drainage development. A new model was devised in which the probability of headward growth depended on the amount of undissected area immediately upslope from the stream tip. The input parameters can be identified with geologic and climatic properties. The model rests on three specific postulates: in the absence of geological controls, channel networks are topologically random; for drainage basins developed under similar environmental conditions, the exterior and interior link lengths are independent random variables with a single common distribution for each type; and the Melton parameter K (ratio of square of mean link length to mean drainage area) is unity. (Knapp-USGS)
W74-10443

WATERHEAD FORECAST POSSIBILITIES ON HYDRAULIC BASIS,
M. Kozak.
Acta Technica Academiae Scientiarum Hungaricae, Vol 75, No 1-4, p 219-233, 1973. 4 fig, 4 tab, 21 ref.

Descriptors: *Mathematical models, *Rivers, Hydraulics, *Water levels, *River forecasting, *Forecasting, Water management(Applied).

Forecasting the water level of rivers in an important water management activity. General solution of the problem may be arrived at by discussing it on a deterministic basis. Economic solution of the differential equation system describing the phenomenon was made feasible by digital calculation engineering. The implicit method, combined with an iteration process, is employed for forecasting. (Murphy-FIRL)
W74-10453

PRITTLE BROOK DIVERSION TUNNEL,
For primary bibliographic entry see Field 8A.
W74-10482

MISSOURI RIVER BASIN COMMISSION, ANNUAL REPORT FOR FY ENDING JUNE 30, 1972.
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10511

NEW ENGLAND RIVER BASINS COMMISSION 1973 ANNUAL REPORT.
New England River Basins Commission, Boston, Mass.
For primary bibliographic entry see Field 6E.
W74-10512

HARRY S. TRUMAN DAM AND RESERVOIR, OSAGE RIVER, MISSOURI, APPENDIX C, (FINAL ENVIRONMENTAL STATEMENT).
Army Engineers District, Kansas City, Mo.
Available from Nat Tech Info Serv, Springfield, Va 22161, as EIS-MO-73-0340-F-2, $18.25 in paper copy, $2.25 in microfiche. February 1973. 324 p, 118 tab, 36 map, 5 chart.

Descriptors: *Missouri, *Environmental effects, *Reservoirs, Dams, *Surface waters, *Flooding(Intentional inundation), Backwater, Water control, Dam construction, Flood control, Water utilization, Water supply, Water storage, Fisheries, Groundwater recharge, Flood damage, Electric power, Dikes, Recreation.
Identifiers: *Environmental Impact Statements, *Osage River(Mo).

The purpose of this project is to construct a dam and reservoir at Warsaw, Missouri, for flood control, hydroelectric power, and recreation. This study includes an evaluation of the environmental impact on the biotic, physical, cultural, recreational, and socioeconomic characteristics in the surrounding area primarily affected by the reservoir. As a result of the reservoir, large deposits of natural resources will be permanently inundated, making mining operations more difficult and more costly. Some of the natural scenic beauty along the Osage River will be concealed by the reservoir waters. The reservoir will increase the potential for significant land developments associated with leisure and recreational activities, but the inundation will cause a reduction in agricultural lands. The reservoir will also raise groundwater levels in the area and will serve to recharge groundwater aquifers, while the surface water acreage will be significantly increased. Wildlife habitat will decrease but fisheries will be greater in size. Alternatives included not building the dam, developing wildlife areas or hatcheries, and construction of retaining walls or dikes. (Conko-Florida)
W74-10523

DISTRIBUTIONAL CONSEQUENCES OF RECREATION PROVISION IN WATER RESOURCE PROJECTS--THE POTHOLES RESERVOIR,
Washington State Univ., Pullman. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W74-10550

EFFECT OF DRAIN DEPTH AND GAP WIDTH ON POTENTIAL FLOW IN HOMOGENEOUS POROUS SOIL,
Waikato Univ., Hamilton (New Zealand). Dept. of Mathematics.
P. C. Cheeseman, R. J. Hosking, and A. D. Sneyd.
Journal of Hydrology, Vol 21, No 3, p 219-229, 1974. 5 fig, 1 tab, 8 ref.

Descriptors: *Potential flow, *Drainage, Soils, Porous media, Numerical analysis, Soil water movement, Theoretical analysis, Impervious soils, *Drains, *Saturated soils.
Identifiers: Flux ratio, New Zealand, Netherlands.

The solution of a problem in potential theory is presented in determining the effect of drain depth and gap width on potential flow in homogeneous porous soil. To control water saturation in soils, it is common to control the water drainage. A two dimensional situation involving a drain is discussed. Seepage flow from an equipotential surface into drains of half width gamma at relative depth is considered to represent the flow through a porous soil either normal to impervious layers with intervening gaps or perhaps to a single row of drain pipes. The equipotential surface may be the soil surface with perhaps ponded water above it, or it may be the level of the water table. An exact solution for the flux ratio, suitable for numerical computation, is found by Schwarz-Christoffel conformal transformation. An asymptotic expression derived for the flux ratio is found to be accurate except for quite small relative depth. (Merritt-FIRL)
W74-10568

FUNCTIONING PROCESS OF DRAINAGE IN HYDROMORPHIC WASHED SOIL (SUR LE PROCESSUS DE FONCTIONNEMENT DES DRAINS EN SOL LESSIVE HYDROMORPHE),
Institut National de la Recherche Agronomique, Dijon (France). Station d'Agronomie.
S. Meriaux.
Annales Agronomiques, Vol 24, No 6, p 639-650, 1973. 6 fig, 2 tab, 10 ref. English summary.

Descriptors: *Soil water movement, *Chlorine, *Drainage, Soil water, Soil structure, Soil profiles.
Identifiers: France, *Soil layers.

Chlorine marking was used to study the mechanism of water movement during drainage in washed soil. The chlorine never goes below a level of 40 cm. It is eliminated by drainage in an essentially lateral movement taking place before remoistening of the lower layers. The lower layers are moistened by pre-existing water in the upper layers of soil by vertical movement independent of drainage. The functioning of drainage in deep beds, as was shown, raises a problem of duration of effectiveness. (Merritt-FIRL)
W74-10570

VALIDITY OF THE MODIFIED BILHAM EQUATION,
West Riding County Council, Yorkshire (England). Highways and Bridges Dept.
For primary bibliographic entry see Field 2B.
W74-10572

OPTIMAL CONTROL OF MULTIUNIT INTER-BASIN WATER RESOURCE SYSTEMS,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
K. Takeuchi, and D. H. Moreau.
Water Resources Research, Vol 10, No 3, p 407-414, June 1974. 6 fig, 2 tab, 28 ref.

Descriptors: *Multiple-purpose projects, *River basin development, *Reservoir operation, *Linear programming, *Dynamic programming, Stochastic processes, Algorithms, Simulation analysis, Equations, Optimization, Economic efficiency, Reservoir storage, Reservoir releases, Inflow, Streamflow, Methodology, Decision making, North Carolina, Mathematical models, Systems analysis.
Identifiers: *Multi-reservoir operation, Economic loss, Storage levels.

A method is presented for finding optimal operating policies for a multi-reservoir water resource system that extends over two river basins and serves multiple demands. The method has been developed and tested for one of several water resource systems proposed for further development in the urbanizing Piedmont Triad region of North Carolina. Monthly operating decisions are given by solutions of a piecewise linear programming problem; the objective function consists of two parts: immediate economic losses within the month and the expected present value of future losses as a function of end-of-month storage levels in the reservoirs. The latter function is estimated by imbedding the linear programming problem in a stochastic dynamic programming problem. An approximate solution technique for the larger problem is described, and computational experience is reported. The approximate solution technique involves the use of simulation in a recursive algorithm. Simulation is used also to test the derived policy on the 40 years of actual streamflow data that exist in the case study area. (Bell-Cornell)
W74-10603

THE ANALYSIS OF SOME MONTHLY HYDROLOGIC TIME SERIES,
Idrutecneco, San Lorenzo in Campo (Italy).
For primary bibliographic entry see Field 2A.
W74-10606

METHODS OF EVALUATING THE EFFECT OF A COMPLEX OF HUMAN FACTORS ON WATER RESOURCES AND WATER REGIME OF WATERSHEDS (O METODAKH OTSENKI VLIYANIYA KOMPLEKSA FAKTOROV KHOZYAYSTVENNOY DEYATEL'NOSTI NA VODNYYE RESURSY I VODNYY REZHIM VODOSBOROV),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10627

IRRETRIEVABLE RUNOFF LOSSES OF THE VOLGA RIVER THROUGH EVAPORATION FROM RESERVOIRS OF THE VOLGA-KAMA CASCADE (BEZVOZVRATNYYE POTERI STOKA R. VOLGI ZA SCHET ISPARENIYA S VODOKHRANILISHCH VOLZHSKO-KAMSKOGO KASKADA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
I. A. Shiklomanov, and G. M. Veretennikova.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i vodnyy rezhim; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 22-51, Leningrad, 1973. 3 fig, 8 tab, 10 ref.

Descriptors: *Runoff, *Water loss, *Evaporation, *Reservoirs, *Human population, Water balance, Volume, Seasonal, Equations.
Identifiers: *USSR, *Volga River, *Kama River(USSR).

Runoff of the Volga is presently regulated by a system of 9 major reservoirs constructed at varying periods on the Volga and Kama Rivers and comprising a single Volga-Kama cascade. Data are given on total volume of runoff losses for the cascade of reservoirs and for each major reservoir separately by year for 1941-69. Maximum runoff losses for a year and a warm season occurred in 1966 and amounted to 4.4 cu km and 6.5 cu km, respectively. During winter, reservoirs of the cascade increase runoff of the Volga by a maximum of 2.0-2.1 cu km (1966, 1967, 1968), which is approximately 3% of winter runoff during these years. Tabulated results of calculations for 1959-69 can be used to estimate runoff variability of the Volga under the effect of man at the present time and in the future and to restore runoff at different gaging stations. According to these calculations, the depth of runoff losses for a year and a warm season has a distinct zonal character and varies between 50 mm and 300 mm for reservoirs in the north and between 300 mm and 470 mm for reservoirs located in the zone of inadequate moisture. Maximum depth of runoff losses occurs at the southernmost (Volgograd) reservoir and is 370 mm for a year and 464 for a warm season. For a winter period, the depth of runoff losses for the reservoirs varies insignificantly and is 150 mm for reservoirs in the north and about 100 mm for reservoirs in the south. (See also W74-10626) (Josefson-USGS)
W74-10628

CALCULATION OF GROUNDWATER RECHARGE AND EVALUATION OF THE EFFECT OF LAND- AND FOREST-IMPROVEMENT PRACTICES (RASCHET PITANIYA GRUNTOVYKH VOD I OTSENKA VLLYANIYA NA NEGO AGROLESOMELIORATIVNYKH MEROPRIYATIY),
Gosudarstvennyii Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10629

EVALUATION OF THE EFFECT OF HUMAN ACTIVITY ON RUNOFF OF LARGE RIVERS IN THE CAUCASUS (KURA, TEREK, KUBAN') (OTSENKA VLIYANIYA KHOZYAYSTVENNOY DEYATEL'NOSTI NA STOK KRUPNYKH REK KAVKAZA (KURA, TEREK, KUBAN')),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10630

OVERLAND FLOW AND ITS VARIABILITY UNDER THE EFFECT OF AGRICULTURAL AND FOREST-IMPROVEMENT PRACTICES (SKLONOVYY STOK I YEGO IZMENENIYE POD VLIYANIYEM AGROTEKHNICHESKIKH I LESOMELIORATIVNYKH MEROPRIYATIY),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
V. Ye. Vodogretskiy, E. A. Zaytseva, and L. V. Yefimova.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i vodnyy rezhim; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 172-207, Leningrad, 1973. 7 fig, 13 tab, 15 ref.

Descriptors: *Overland flow, *Slopes, *Runoff, *Agricultural engineering, *Forest management, Forests, Shelterbelts, Grasslands, Cultivated lands, Soil types, Soil moisture, Runoff coefficients, Freezing, Snow cover, Seasonal, Variability, Correlation analysis, Regression analysis, Curves, Equations.
Identifiers: *USSR.

Procedures are developed for estimating the effect of agricultural practices on overland flow, based on analysis of the relation of the runoff coefficient to soil moisture, soil freezing, and slope gradients. These procedures can be used to estimate the effect of agricultural practices by considering differences in soils and slope gradients for forested and forested-steppe zones of European Russia and the steppe zone of Northern Kazakhstan. Reduction in mean annual runoff on plowed slopes is substantial in forested-steppe and steppe zones. For slopes with gradients greater than 20%, reduction in runoff is 15% and 35%, respectively, and for small gradients (<20%) it is 30% and 40%. In the wet forested zone reduction in runoff does not exceed 5-10%; for small gradients it reaches 15-25%. To calculate possible reduction in runoff from forested slopes and slopes intersected by shelterbelts, formulas are given which take into account the effects of a slope gradient and the extent of forests covered by shelterbelts. The effect of a forest is considerable; with slope gradients of 0 to 150%, reduction in runoff is 100-50%. The effect of shelterbelts on reduction of overland flow is even more significant if the shelterbelts are located at right angles to the slope. (See also W74-10626) (Josefson-USGS)
W74-10634

FLOOD HAZARD ANALYSES, BONNER BRANCH OF THE PECATONICA RIVER, BELMONT, WISCONSIN.
Soil Conservation Service, Madison, Wis.
For primary bibliographic entry see Field 2E.
W74-10635

HYDROLOGIC DATA FOR NORTH CREEK TRINITY RIVER BASIN TEXAS, 1972,
Geological Survey, Austin Tex.
For primary bibliographic entry see Field 7C.
W74-10640

PHOTO-HYDROLOGICAL RECONNAISSANCE SURVEYS,
International Inst. for Aerial Survey and Earth Sciences, Enschede (Netherlands).
For primary bibliographic entry see Field 7B.
W74-10648

DRAINAGE OF LEVEL OR NEARLY LEVEL ROADS,
Transport and Road Research Lab., Crowthorne (England). Structural Properties Div.
For primary bibliographic entry see Field 4C.
W74-10660

AN ESTIMATE OF LEAKAGE FROM BLACKFOOT RESERVOIR TO BEAR RIVER BASIN, SOUTHEASTERN IDAHO,
Geological Survey, Tacoma, Wash.
N. P. Dion.
Idaho Department of Water Administration Boise Water Information Bulletin No 34, February 1974. 24 p, 7 fig, 1 tab, 23 ref. $0.50 per copy.

Descriptors: *Reservoir leakage, *Idaho, *Surface-groundwater relationships, Water loss, Seepage, Basalts, Aquifers, Water balance, Hydrologic budget, Permeability.
Identifiers: *Blackfoot reservoir(Ida), *Bear River basin(Ida).

Water is leaking out of the Blackfoot reservoir in Idaho (Snake River drainage) into the Soda Creek basin (Bear River drainage). The basalt of the Blackfoot Lava Field varies locally from a very productive aquifer to only a fair aquifer. Yields are 200 to 3,500 gallons per minute and specific capacities 3 to 3,500 gpm per foot of drawdown. Numerous carbonated springs occur in the headwaters and along the course of Soda Creek, and extensive deposits of tufa occur in the Soda Creek drainage. It is probable that the tufa has affected the permeability of the basalt, at least locally where the springs now discharge or have discharged in the past. Modified hydrologic-budget analyses compare actual and expected yields of subbasins. The amount of leakage from the Blackfoot River basin is about 10 cubic feet per second. The excess yield of Soda Creek is about 52 cfs. The excess yield between gaging stations on Bear River upstream and downstream from the mouth of Soda Creek is 49 cfs. Much of the difference between the estimated leakage from Blackfoot Reservoir and the water yield of Soda Creek and Bear River is the contribution of the numerous carbonated springs in the region. Raising the stage of the reservoir 9 feet, as proposed, would increase both the hydraulic gradient of the groundwater south of Blackfoot Reservoir and leakage from the reservoir to Soda Creek basin by about 60%. (Knapp-USGS)
W74-10661

SIMPLE METHOD FOR PREDICTING DISPERSION IN STREAMS,
Geological Survey, Bay Saint Louis, Miss.
For primary bibliographic entry see Field 5B.
W74-10676

RANGELAND HYDROLOGY,
Geological Survey, Denver, Colo.
F. A. Branson, G. F. Gifford, and J. R. Owen.
Society for Range Management, Denver, Colorado, Range Science Series No 1, October 1972. 84 p, 27 fig, 13 tab, 274 ref.

Descriptors: *Grasslands, *Hydrology, *Water yield, *Erosion, *Range management, Water balance, Arid lands, Water management(Applied), Water quality, Groundwater, Evapotranspiration, Precipitation(Atmospheric), Interception, Infiltration, Runoff, Sedimentation, Geomorphology.
Identifiers: *Rangeland hydrology.

Rangeland hydrology, or rangeland watershed management, is the study of hydrologic principles as applied to range ecosystems. Although rangelands encompass many different climatic zones, this booklet deals chiefly with rangeland hydrology in arid and semiarid regions. Of the approximately 40% of the world's land surface that is classified as rangeland, over 80% is within arid and semiarid zones. Generally, these lands are characterized by extremes in the various components of the hydrologic cycle, examples being low rainfall, high evapotranspiration potential, and low water yield. Intermittent streams common on arid and semiarid rangelands have different characteristics than do permanent streams of more humid areas, and the time required to obtain statistically reliable results from rangeland studies may be long because of the low frequency of runoff events, relatively small runoff quantities, and highly variable precipitation. The major concerns of rangeland hydrology may be divided into four categories: (1) runoff or water yields from watersheds, (2) erosion and sedimentation, (3) quality of water, and (4) occurrence of groundwater. (Knapp-USGS)
W74-10682

FLOOD PLAIN INFORMATION--PETERS CREEK, BIRCHWOOD, ALASKA,
Corps of Engineers, Anchorage, Alaska.
Army Corps of Engineers Flood Plain Report, May 1974. 12 fig, 14 plate, 2 tab.

Descriptors: *Floods, *Alaska, *Flood plains, Flood control, Flood protection, *Data collections, Flood plain zoning, Hydrologic data.
Identifiers: Birchwood(Alaska), Peter Creek(Alas).

A portion of the community of Birchwood, Alaska, is subject to flooding from Peters Creek. The properties along this stream are primarily residential and were moderately damaged by the flood of August 1971. The open spaces in the flood plains which are now under pressure for future development are extensive. A history of flooding along Peters Creek identifies those areas that are subject to possible future floods. Special emphasis is given to these floods through maps, photographs, profiles, and cross sections. A suitable basis is given for the adoption of land use controls to guide flood plain development. Other flood damage reduction techniques such as works to modify flooding and adjustments, including flood profiling, might be embodied in an overall flood plain management program. (Knapp-USGS)
W74-10684

SURFACE WATER SYSTEM -- 1973,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 7C.
W74-10695

PRACTICES IN DETENTION OF URBAN STORMWATER RUNOFF,
Poertner (Herbert G.), Bolingbrook, Ill.
H. G. Poertner.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 554, $5.75 in paper copy, $2.25 in microfiche. Special Report No. 43, American Public Works Association, Chicago, Illinois, 1974. 231 p, 61 fig, 42 tab, 140 ref, 8 append. OWRR C-3380(No 3722)(1).

Descriptors: *Storage, *Urban runoff, *Detention reservoirs, *Flow rates, *Urban drainage, *Pondage, Drainage systems, Flood control, Overland flow, Flood routing, Design standards, Hydraulics, Reservoir storage, Groundwater recharge, Impounded waters, Runoff, *Storm runoff, Surface runoff, Sewers, Storm drains, Urbanization, Urban hydrology, Water pollution control, Erosion control, Silting, Infiltration, *Storm water.
Identifiers: *On-site stormwater detention.

On-site detention of runoff was investigated as an alternative to other methods of urban stormwater runoff management. It was found that this method, which involves collecting excess runoff before it enters the sewer system, can often be applied as an effective and economical means of reducing peak runoff flow rates to lessen or eliminate problems of flooding, pollution, soil ero-

sion and siltation. The captured runoff sometimes can be used to augment water supplies for potable or non-potable uses, and the detention facilities can be designed to serve multiple-purpose uses, especially recreation. The use of on-site detention facilities has been given emphasis in those urban areas where flooding is a frequent problem. A 1972 survey of selected local jurisdictions in urban areas of the United States and Canada revealed that more than 1,400 facilities were operational in about 100 local jurisdictions reporting applications. Because only about 500 jurisdictions were contacted, the actual number of such facilities in existence is thought to be many times more. Most of the representatives of the 230 public agencies and 40 engineering firms that responded to the survey questionnaire consider on-site detention of runoff in urban areas to be a useful stormwater management method that is worthy of study and implementation. Many applications of the method were identified in which substantial cost savings over a conventional urban stormwater drainage system had been realized by incorporating on-site detention of runoff into the system. The use of on-site detention facilities in managing runoff in urban communities can be expected to increase as the techniques and benefits become more widely known.
W74-10696

PUBLIC WORKS FOR WATER AND POWEER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1975, PART I, PART II.
For primary bibliographic entry see Field 6E.
W74-10697

WATER BANK ACT.
Committee on Merchant Marine and Fisheries (U. S. House).
For primary bibliographic entry see Field 6E.
W74-10705

PERIODICITY OF WOOD FORMATION IN SOME TREES OF LOWLAND RAINFOREST IN NIGERIA,
Nigeria Univ., Nsukka. Dept. of Botany.
For primary bibliographic entry see Field 2I.
W74-10730

PLAYING TO WIN IN THE DRAINAGE GAME,
For primary bibliographic entry see Field 6E.
W74-10733

(DEATH OF A POND. DEATH OF A RIVER. THE SOUND AND FURY).
For primary bibliographic entry see Field 5G.
W74-10735

SCHEDULING IRRIGATIONS WITH HIGH-SPEED DATA FROM A COMPUTER,
T. Milligan.
Irrigation Age, Vol 7, No 10, p 4, 10, 11, May, 1973.

Descriptors: *Irrigation, *Scheduling, Irrigation practices, Irrigation systems, *Idaho, Data processing.
Identifiers: *Irrigation scheduling.

A commercial irrigation scheduling firm in Idaho is described. The firm utilizes a program developed by Marvin Jensen at the Kimberly Research Center. The system feeds basic information related to a crop's water use, time of peak water use and other pertinent data to a computer to determine the optimum irrigation schedule. (Skogerboe-Colorado State)
W74-10743

SOIL AND WATER CONSERVATION RESEARCH: CHALLENGE FOR THE 70'S,
Agricultural Research Service, Beltsville, Md. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 3F.
W74-10750

RELATIONSHIPS BETWEEN SOIL SALINITY AND THE SALINITY OF APPLIED WATER IN THE SUISUN MARSH OF CALIFORNIA,
California State Dept. of Fish and Game, Sacramento.
G. L. Rollins.
Calif Fish Game. Vol 59, No 1, p 5-35. 1973.
Identifiers: *California(Suisun Marsh), Flooding, Leaching, *Marshes, *Salinity, *Soil salinity, Waterfowl food plants, Water management(Applied).

Investigations were conducted on 4 private duck clubs under typical water management practices and in a test pond where water management and surface water salinities were controlled. A significant correlation existed between the salinity of applied water and the salinity in the first and second ft of soil. The flooding of marsh soils with highly saline water, under present marsh management practices, would greatly increase existing soil salinities. The leaching of marsh soils by alternate flooding and draining with low salinity water was an effective means of reducing soil salinity. The type of water management practiced by the duck clubs studied produces extremely high soil salinities which inhibit the production of valuable waterfowl food plants. Leaching is recommended as general practice in Suisun Marsh (California) to reduce soil salinity and enhance the production of the more important waterfowl food plants.--Copyright 1973, Biological Abstracts, Inc.
W74-10764

HYDROGEOLOGY FIELD TRIP, EAST BAY AREA AND NORTHERN SANTA CLARA VALLEY,
Stanford Univ., Calif.
For primary bibliographic entry see Field 2F.
W74-10850

LAND DRAINAGE OF REDDISH CLAY LOAMS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 3F.
W74-10879

COMPARISON OF DRAINAGE METHODS IN A HEAVY-TEXTURED SOIL,
Ohio Agricultural Research and Development Center, Wooster.
For primary bibliographic entry see Field 3F.
W74-10881

CHEMICAL METHOD OF PREVENTING LOSS OF INDUSTRIAL AND FRESH WATERS FROM PONDS, LAKES AND CANALS,
Dow Chemical Co., Tulsa, Okla. Dowell Div.
R. B. Rosene, and C. F. Parks.
Water Resources Bulletin, Vol 9, No 4, p 717-722, August, 1973. 2 fig, 5 ref.

Descriptors: *Seepage, *Seepage control, *Sealants, Polymers, Water loss, Groundwater, Impervious membranes, Leakage, Linings, Reservoir leakage, Soil sealants.

Preventing or markedly reducing the loss of aqueous fluids from a variety of reservoirs is becoming increasingly important. Fear of pollution from industrial waters and sewage impoundments as well as the economic factors involved in loss of fresh water add impact to this problem. The seriousness of the problem is reviewed and methods that have been used to reduce loss of fluid are discussed. New materials for control of water loss are constantly being advocated, and chemical research has provided new systems that work extremely well. These systems, which combine unique chemicals and novel methods of application, are described. Specific case histories are included. (Skogerboe-Colorado State)
W74-10883

PROGRESS IN THE RURAL WATER PROGRAMS OF LATIN AMERICA,
Pan American Health Organization, Washington, D.C.
For primary bibliographic entry see Field 6B.
W74-10887

COUNTY WATER SYSTEM SOLVES DRY AREA PROBLEMS,
Salt Lake County Water Conservancy District, Utah.
For primary bibliographic entry see Field 6D.
W74-10894

4B. Groundwater Management

A GROUNDWATER QUALITY MODEL: A HYBRID COMPUTER SIMULATION,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 5B.
W74-10352

WATER RESOURCES INVESTIGATIONS IN ARIZONA, 1973.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-10362

ANALOG MODEL STUDY OF THE GROUNDWATER BASIN OF THE UPPER COACHELLA VALLEY, CALIFORNIA,
Geological Survey, Washington, D.C.
S. J. Tyley.
Available from Sup Doc., GPO, Washington, D.C. 20402, price $1.05. Water-Supply Paper 2027, 1974. 77 p, 35 fig, 15 tab, 52 ref.

Descriptors: *Analog models, *California, *Groundwater basins, Groundwater movement, Water levels, Water yield, Water quality, Artificial recharge, Withdrawal, Hydrogeology.
Identifiers: *Coachella Valley(Calif).

An analog model of the groundwater basin of the upper Coachella Valley, California was constructed to determine the effects of imported water on groundwater levels. Groundwater levels generated by the model approximated the historical change in water levels for the period 1936-67. The groundwater basin was almost unaffected by man's activities until about 1945 when groundwater development caused the water levels to begin to decline. The Palm Springs area has had the largest water-level decline, 75 feet since 1936, because of large pumpage, reduced natural inflow from the San Gorgonio Pass area, and diversions of natural inflows at Snow and Falls Creeks and Chino Canyon starting in 1945. The most logical area to recharge the Colorado River water is the Windy Point-Whitewater area, where adequate percolation rates of 2-4 acre-feet per acre per day are probable. The Whitewater River bed may be the best location to spread the water if the largest part of the imported water can be recharged during low-flow periods. Projected pumpage for the period 1968-2000 was programmed on the model with the proposed recharge of Colorado River water for the same period. The model indicated a maximum water-level increase of 200 feet above the 1967 water level at Windy Point, the proposed recharge site, by the year 2000, a 130-foot increase by 1990, and a 20-foot increase by 1980. The model indicated that the proposed quantities of recharge

will beneficially affect the groundwater system to Palm Desert by 1980, to Point Happy by 1990, and possibly to the Coachella Canal by 2000. The model indicated that the upper and lower valleys are within the same hydrologic system. (Knapp-USGS)
W74-10363

GEOLOGY AND HYDROLOGY OF RICE COUNTY, CENTRAL KANSAS,
Geological Survey, Lawrence, Kans.
C. K. Bayne, and J. R. Ward.
Bulletin 206, Part 3, April 1974. 17 p, 12 fig, 1 tab, 12 ref.

Descriptors: *Hydrogeology, *Water resources, *Kansas, Aquifers, Hydrologic data, Water wells, Water yield.
Identifiers: *Rice County(Kans).

The principal aquifer in Rice County, Kansas is in the Pleistocene fluvial deposits where yields to irrigation wells of 1,000 gpm are common and, locally, yields may be as much as 2,000 gpm. Sandstone aquifers in the Kiowa and Dakota Formations commonly yield an adequate supply of water for domestic and stock wells, and may yield as much as 150 gpm. The water in the Pleistocene deposits is a calcium bicarbonate type and is very hard. Water in the sandstone also is a calcium bicarbonate type where the overlying Pleistocene aquifer is in hydraulic connection. If an appreciable thickness of shale separates the aquifers, the water in the sandstone may be a sodium bicarbonate type. Highly mineralized water from formations below the Kiowa may occur at shallow depths as a result of local contamination by oilfield brines or industrial wastes. (Knapp-USGS)
W74-10408

ESSENTIALS OF GROUND-WATER HYDROLOGY PERTINENT TO WATER-RESOURCES PLANNING,
Water Resources Council, Washington, D.C. Hydrology Committee.
For primary bibliographic entry see Field 2F.
W74-10410

WATER-TABLE CONTOUR MAP, ANCHORAGE AREA, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 7C.
W74-10436

INFORMATION STORAGE AND RETRIEVAL SYSTEM FOR WELL HYDROGRAPH DATA USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept.
D. R. Friedrichs.
Available from NTIS, Springfield, Va 22161 as BNWL-1705, Price $5.45 printed copy; $2.25 microfiche. Report BNWL-1705 (UC-70), 1972. 48 p, 9 fig, 3 tab, 1 ref, 5 append. USAEC Contract AT(45-1)-2130.

Descriptors: *Computer programs, *Hydrographs, *Water level fluctuations, *Water wells, *Data processing, *Data storage and retrieval, Groundwater.
Identifiers: Well hydrographs.

Programs used in storage and retrieval of well hydrograph data are described and listed. The programs are used on either a UNIVAC 1108 computer or a PDP-9 computer, depending upon their function. The UNIVAC 1108 computer programs are transmitted from the PDP-9 to the 1108 via a data communication link for execution. The computations are returned to the PDP-9 via the data link and manipulated by the PDP-9 computer programs to provide the required output options. Preparatory functions are performed before the execution of the main PDP-9 computer program DSWELL, which is the actual data retrieval and display program. The functions of each of the programs is described in detail. (Knapp-USGS)
W74-10442

COST OF DEVELOPING GROUND WATER IN THE PAT HARRISON WATERWAY DISTRICT, MISSISSIPPI,
University of Hattiesburg, Southern Missippi. Bureau of Business Research.
D. J. Etzold, D. C. Williams, Jr., and Modena Guice.
Available from the National Technical Technical Information Service, Springfield, Va 22161 as PB-234 433, $3.25 in paper copy, $2.25 in microfiche. Mississippi Water Resources Research Insitute Mississippi State, Completion Report, July 1974. 30 p, 18 tab, 5 ref. OWRR A-069-MISS(1).

Descriptors: *Costs, Economics, *Alternative water use, Planning, *Mississippi, *Water uses, *Water districts, *Groundwater, Aquifers, Water utilization, Water wells, *Cost analysis, *Operating costs, Maintenance costs.

The purpose was to estimate the cost of water from aquifers in the Pat Harrison Waterway District. In meeting this objective, other information for use in planning and managing water resources in the District was obtained including water use per capita. Major cities, smaller municipalities and rural water systems in the District were selected for study. The wells in operation were drilled at different times. Thus, present costs of such wells were estimated and amortized over a 20 year period to provide a common time base for cost analysis. Annual operation and maintenance costs were examined. Thus, fixed and variable costs were included as separate components. The costs were converted to the cost per 1,000 gallons. Although the costs varied by system, there were similarities. The gallons of water produced per capita and per metered customer were significantly higher for the cities than for the smaller systems.
W74-10530

AN EVALUATION OF SUBSURFACE TECHNIQUES FOR AQUIFER PREDICTION IN COMPLEX SEDIMENTARY SYSTEMS,
Mississippi State Univ., State College. Dept. of Geology and Geography.
For primary bibliographic entry see Field 2F.
W74-10533

MANAGEMENT AND ADMINISTRATION OF GROUND WATER IN INTERSTATE AQUIFERS, PHASE II,
Bittinger (M. W.) and Associates, Inc., Fort Collins, Colo.
M. W. Bittinger, E. B. Jones, and W. H. Fischer.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 432, $7.25 in paper copy, $2.25 in microfiche. Completion Report, June 1974, 300 p, 23 fig, 17 tab. OWRR C-3072 (No 3681)(1).

Descriptors: *Groundwater, *Aquifers, *Interstate, *Water law, *Water management(Applied), *Administration, Prior appropriation, Common law, Legal aspects, *Interstate compacts, Legislation.

Case studies of six interstate aquifer situations are presented. Case-study areas were selected so as to achieve a range in physical, legal, and socio-economic conditions. The States and the aquifers involved in the interstate aquifer case studies are as follows: Virginia-North Carolina (Coastal Plain Aquifer); Vermont-New Hampshire-Massachusetts-Connecticut (Connecticut River Quaternary Aquifer System); Illinois-Wisconsin (Cambrian-Ordovician Aquifer); Wyoming-Nebraska (North Platte River Alluvium); Texas-New Mexico (Ogallala Formation); Washington-Idaho (Spokane River Valley-Rathdrum Prairie Aquifer System). The case study of each situation involved a review of pertinent literature plus interviews with many Federal, Regional, State, and local authorities. The legal analysis explores the alternatives open to individuals and State legislatures in resolving interstate ground-water conflicts.
W74-10537

APPLICATION OF GROUNDWATER HYDRAULICS TO A BASALTIC WATER-TABLE AQUIFER,
Central Groundwater Board, Nagpur (India).
P. G. Adyalkar, and V. V. S. Mani.
Journal of Hydrology, Vol 21, No 3, p 211-218, 1974. 2 fig, 3 tab, 10 ref.

Descriptors: *Aquifers, *Basalts, Groundwater, Hydraulics, *Water table, Hydrogeology, *Pumping, Analytical techniques, Analysis, *Water wells, *Testing procedures.
Identifiers: India, Thiem's formula, Narasimhan's ratio method.

An analysis of pump test data of open wells in a basaltic water table aquifer was made with methods based on both equilibrium and non-equilibrium formulae. The study has indicated that the Thiem's equilibrium formula and the ratio method of Narasimhan appear to be more suitable as compared with Jacob's and Chow's methods. Of the two, Narasimhan's ratio method, which does not require the graphical procedure, is more reliable than the Thiem's method since the latter involves an assumption of the value for the radius of influence. From the value of T (coefficient of transmissibility) obtained by Narasimhan's method, it is also possible to calculate the value of the radius of influence by Thiem's method, which can be used in determining the required spacing between wells in the basaltic terrain in order to avoid mutual interference. (Merritt-FIRL)
W74-10569

TRITIUM WATER TRACING,
Atomic Energy Research Establishment, Harwell (England).
For primary bibliographic entry see Field 5B.
W74-10615

APPLICATION OF GEOPHYSICAL METHODS IN THE INVESTIGATION OF MINERAL AND THERMAL WATERS,
Institute for Geological and Geophysical Research, Belgrade (Yugoslavia).
B. Milonovic.
Available from NTIS, Springfield, Va. 22161 as TT-72-56033, Price $3.00 printed copy; $2.25 microfiche. Technical Translation TT 72-56033, NOLIT Publishing House, Belgrade, Yugoslavia, 1973. 8 p, 4 fig.

Descriptors: *Geophysics, *Thermal water, *Mineral water, *Exploration, *Subsurface investigations, Borehole geophysics, Seismic studies, Temperature, Electrical studies, Resistivity.
Identifiers: *Yugoslavia.

In the investigation of mineral and thermal waters geophysical methods may be applied for solution of structural geological problems and evaluation of the hydrogeological properties of rocks and the mineralization of subterranean waters. Temperature anomalies on the surface indicate the subterranean flow paths of thermal waters. These data help to elucidate the geological structure of the terrain and its hydrogeology and enable choice of the most favorable locations for boring. Electric resistivity plotting is the geophysical method most frequently used in investigation of groundwaters in general. Seismic reflection methods can also be used for solution of structural geological problems. (Knapp-USGS)
W74-10645

WATER AVAILABILITY IN CENTRAL WISCONSIN - AN AREA OF NEAR-SURFACE CRYSTALLINE ROCK,
Geological Survey, Washington, D.C.
E. A. Bell, and M. G. Sherrill.
Available from Superintendent of Documents GPO, Washington, D.C. 20402, Price $4.25 (paper cover). Water-Supply Paper 2022, 1974. 32 p, 9 fig, 6 tab, 43 ref.

Descriptors: *Water resources, *Wisconsin, *Groundwater, *Surface waters, Glacial drift, Alluvium, Aquifers, Hydrogeology, Induced infiltration, Water quality, Surface-groundwater relationships.

Available groundwater in much of central Wisconsin is limited to discharge through wells of low yield. Aquifers that yield small amounts of water to wells include fractured crystalline rock at or near surface in the eastern part of the area, sandstone overlying crystalline rock in the southern and western parts, and glacial till. Outwash sand and gravel in segments of some bedrock channels, however, yield large supplies of water to wells. Wells in surficial sand and gravel in the lower valleys of major tributaries to the Wisconsin River yield as much as 450 gpm. Sand and gravel in segments of bedrock channels are covered by till or alluvium; wells in these sand and gravel deposits yield 100-400 gpm. Induced recharge to buried aquifers by infiltration of water through the beds of overlying streams is feasible at six sites within 8 miles of Marshfield. Infiltration through the streambed of Little Eau River about 7 miles northeast of Marshfield was about 200 gpm when the groundwater level was lowered temporarily. Additional recharge through ponding is possible at other sites. Streamflows in the area generally are not dependable sources of municipal or industrial supplies without storage. Chemical quality of water in the area is suitable for most uses. Groundwater is hard, contains objectionable concentrations of iron, and locally is high in nitrate content. Surface water has an average dissolved-solids content of about 100 mg/l. (Knapp-USGS)
W74-10647

AN EXPERIMENTAL MEASUREMENT OF IN SITU STRESS IN GRANITE BY HYDRAULIC FRACTURING,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 8E.
W74-10663

THE STRANGE WORLD OF MISCIBLE DISPLACEMENT,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-10664

HYDROLOGY OF LAKE TARPON NEAR TARPON SPRINGS, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2H.
W74-10673

OGALLALA AQUIFER WATER-LEVEL DATA, WITH INTERPRETATION, 1965-1974,
High Plains Underground Water Conservation District No. 1, Lubbock, Tex.
C. Rayner.
June 1974. 81 p, 15 fig, 18 ref.

Descriptors: *Water levels, *Observation wells, Texas, *Basic data collections, Groundwater, Water table, Water districts.
Identifiers: *Ogallala aquifer(Tex), *High Plains(Tex).

Water levels in the Ogallala aquifer of the High Plains Underground Water Conservation District No. 1 measured from 1955-1971 in the observation well program are tabulated. An analysis of the historical and current trends of the changes in water levels and an analytical discussion on rates on rates of aquifer dipletion are presented. The current observation well network in the District consists of 835 wells. (Knapp-USGS)
W74-10685

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE CLOSED BASIN DIVISION OF THE SAN LUIS VALLEY PROJECT, COLORADO.
Committee on Interior and Insular Affairs (U.S. Senate).
For primary bibliographic entry see Field 6E.
W74-10706

SANITARY LANDFILL LEACHATE INTERACTIONS WITH A CARBONATE-ROCK DERIVED SOIL IN CENTRAL PENNSYLVANIA,
Pennsylvania State Univ., University Park. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 5B.
W74-10827

RESISTIVITY METHODS IN PROSPECTING FOR GROUND WATER,
Kansas State Univ., Manhattan. Dept. of Geology.
D. W. Steeples.
M Sc Thesis, 1970. 48 p, 7 fig, 3 tab, 27 ref, append.

Descriptors: *Groundwater recharge, Alluvium, Erosion, Bedrock, Electrodes, Electrical resistivity, Transmissivity, *Hydrologic properties, *Kansas.
Identifiers: *Electrode spacing intervals, *Wenner electrode configuration, *Direct current earth resistivity, *Groundwater exploration.

As part of groundwater recharge studies, a method of groundwater exploration was developed. Resistivity is better suited to application in conjunction with a limited but well-planned test-drilling program. The resistivity survey in this investigation was performed with portable direct current equipment in a four-square-mile area just east of Manhattan, Kansas. The Wenner electrode configuration ultimately became the basis for the field work. The method developed can be recommended for use in areas where alluvium covers bedrock. The method should not be used by itself without test drilling or some other independent method of exploration. (Staplin-NWWA)
W74-10832

UNDERGROUND STORAGE OF NATURAL GAS IN ILLINOIS-1973,
Geological Survey, Urbana, Ill.
For primary bibliographic entry see Field 8E.
W74-10834

APPLICATIONS OF INHOLE GEOPHYSICAL LOGS IN VOLCANIC ROCKS, NEVADA TEST SITE,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 8G.
W74-10846

ENERGY SHORTAGE STIMULATES GEOTHERMAL EXPLORATION,
Geosystems Corp., N.Y.
R. L. Fuchs, and W. H. Westphal.
World Oil, Vol 177, No 7, p 37-41, December, 1973. 3 tab.

Descriptors: *Geothermal studies, Energy, Electric power production, Drilling, *Industries, Geochemistry, Geysers, Hot springs, Steam, Subsurface water, Thermal water.
Identifiers: *Energy shortage, Energy reserves, *Geothermal exploration, Geothermal history, Geothermal Steam Act of 1970.

Extensive exploration programs now are underway in the western United States to evaluate potential of geothermal energy. A variety of companies are involved in the effort, including many gas and oil producers. Advantages of geothermal energy as a power source can be demonstrated, and these account for its increasing stature in the energy picture. Environmental impact of electrical power generation using geothermal energy is well below that of other power systems, even though noise, noxious gases and waste water may have to be contended with in the field. Geothermal impact on future U.S. energy requirements is theoretically very large, but in a commercial and practical sense, largely unknown. Until the search is made, extent and value of U.S. geothermal energy resources remain vague. Nevertheless, even though precluded from exploring the major part of the potential lands, private industry has moved ahead dramatically in the geothermal field, spurred by competitive and economic incentives arising out of the energy crisis. Steady growth in exploration and in the development of new geothermal fields is forecast. (Martino-NWWA)
W74-10851

SURFACE TO SUBSURFACE CORRELATION OF COLUMBIA RIVER BASALT USING GEOPHYSICAL DATA IN PARTS OF ADAMS AND FRANKLIN COUNTIES, WASHINGTON,
Washington State Univ., Pullman. Dept. of Civil Engineering.
B. A. Siems.
College of Engineering Bulletin 331, 1973. 65 p, 20 fig, 23 ref, append.

Descriptors: *Borehole geophysics, *Subsurface mapping, Logging, Radioactive well logging, Columbia River, *Surface-groundwater relationships, *Washington, *Basalts.
Identifiers: Gamma log, Neutron-epithermal log, *Columbia River Basalt.

Stratigraphic work in the Columbia River Basalt has utilized differences in outcrop and petrographic characteristics. However, the northeastern part of the plateau has limited outcrop, and seems well-suited for an attempt to extend surface mapping into the subsurface using geophysical logs of deep wells. Emphasis has been placed on the natural gamma and neutron-epithermal neutron logs. The neutron-epithermal log has been found to be valuable for locating flow contacts. Two marker features were recognized on the gamma logs: a gradual increase in natural radioactivity with depth in the upper 150-250 feet of the Frenchman Springs Member, and a marked high gamma spike at the probable stratigraphic position of the Quincy Diatomite. Correlations using these features, the known geology, and the TiO2 analyses, suggest the existence of 530 feet of Frenchman Springs Basalt in one well. This is about 130 feet less than is recognized on well logs from two coreholes in the Hanford Reservation and 40 feet more than exists near the mouth of Devils Canyon, south of Kahlotus. Natural gamma correlations also indicate an increase in southerly dip just north of Cunningham, possibly the continuation of the Frenchman Hill anticline to the west. (Staplin-NWWA)
W74-10858

HOW GEOTHERMAL WELLS ARE DRILLED AND COMPLETED,
Big Chief Drilling Co., Oklahoma City, Okla.
For primary bibliographic entry see Field 8A.
W74-10860

REPORT ON THE LAMBOURN VALLEY PILOT SCHEME, 1967-1969,
Thames Conservancy, Reading (England).
E. J. Brettel.

1971. 170 p, 65 fig, 24 tab, 21 ref.

Descriptors: *Groundwater resources, Water resources development, *Surface water availability, *Surface-groundwater relationships, *Feasibility studies.
Identifiers: *Thames River(UK), *Lambourn Valley Pilot Scheme(UK), Thames Catchment, Thames Conservancy.

Results are presented of an investigation into the feasibility of a proposal to develop groundwater resources for the purpose of augmenting stream flow whenever necessary, and thus to increase the surface water resources of the Thames Catchment. The Lambourn Catchment is described, and the three-year program of test pumping. The results of the general hydrological studies are summarized and applied to the analysis of the observations made during the pumping tests. The Conservators' proposals are shown to be feasible, and general conclusions are drawn concerning the planning of their Groundwater Scheme. The results show that groundwater resources in the chalk and the limestone of the Thames Catchment can be developed to augment stream flow by 100 mgd. It is proposed that this development take place in five stages, beginning as soon as possible and to be completed by 1981. (Staplin-NWWA)
W74-10862

CONTROL OF UNCONSOLIDATED SANDS IN WASTE-DISPOSAL WELLS,
Subsurface Disposal Corp., Houston, Tex.
For primary bibliographic entry see Field 8A.
W74-10868

DEEP DISPOSAL SYSTEMS FOR RADIOACTIVE WASTES,
Office of Environmental Affairs (AEC), Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-10869

THE OCCURRENCE OF WATER IN THE PRECAMBRIAN CRYSTALLINE ROCKS OF THE NEW JERSEY HIGHLANDS,
Rutgers. The State Univ., New Brunswick, N.J.
A. D. James.
M Sc Thesis, May, 1967. 74 p, 28 fig, 11 tab, 59 ref.

Descriptors: *Water wells, *Crystalline rocks, *Groundwater, Granites, Igneous rocks, Metamorphic rocks, Porosity, Permeability, Stress, Specific yield, Topography, Drilling, Drill holes, Faulting, *Well data, New Jersey, Precambrian era.
Identifiers: *New Jersey Precambrian Highlands, Well depth, Exploration drilling, Groundwater development.

Well records from approximately 900 wells were obtained from the office of the New Jersey State Geologist at Trenton. The specific capacities and yields per foot of well were computed for each well, and their locations were plotted on maps with a scale of one mile to the inch. Approximately 400 of these wells were replotted more accurately on 7 1/2 minute United States Geological Survey quadrangles. Each well was plotted on the 7 1/2 minute quadrangles primarily by referring to a sketch map which was included in each well record. Road maps, housing development maps and air photos were also referred to in the plotting. Doubtful well locations were field checked. A review is presented of previous work on the occurrence of water in crystalline rocks and with the occurrence of water in the New Jersey Precambrian Highlands. (Staplin-NWWA)
W74-10872

HOW WELLS AFFECT SHALLOW GLACIAL GROUND-WATER SUPPLIES IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Agricultural Extension Service.
F. F. Kerr, M. J. Tipton, J. W. Grimes, J. E. Powell, and E. F. LeRoux.
(1970). 11 p, 11 fig.

Descriptors: Groundwater management, Groundwater recharge, *Water levels, *Pumping, *Glacial aquifers, *South Dakota.
Identifiers: *Glacial groundwater.

An explanation is provided of how groundwater levels react when water is withdrawn by pumping and how groundwater is being managed. Consideration is given only to the glacial groundwater aquifers, most of which are very shallow. Part I discusses what groundwater is, how it accumulates underground, and the different underground formations in which it is found. Part II discusses the effect of pumping on groundwater supplies. Part III explains the management procedures used in South Dakota to maintain an inventory of groundwater levels so that depletion of these waters may be avoided. (Campbell-NWWA)
W74-10873

4C. Effects On Water Of Man'S Non-Water Activities

MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS,
Utah State Univ., Logan. Inst. for Social Science Research on Natural Resources.
W. H. Andrews, J. P. Riley, C. W. Colton, G. B. Shih, and M. B. Masteller.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 318; $4.50 in paper copy, $2.25 in microfiche. Utah Water Research Laboratory, Logan, Report PRWG109-1, April 1973. 108 p, 22 fig, 8 tab, 194 ref, 3 append. OWRR C-3272(3712)(1).

Descriptors: *Urban sociology, *Social impact, *Decision making, *Social change, *Urban hydrology, *Computer models, *Simulation analysis, *Flood control, Social values, Social participation, Social function, Recreational demand, Economic impact, Aesthetics, Water management, Hydrology, Mathematical models, Hydrologic models, Channel improvements, *Utah.
Identifiers: *Salt Lake County(Utah), *Urban flooding, *Salt Lake City(Utah), Wasatch Front, Jordan River(Utah).

The first phase is described of a larger study directed toward the development of a general technique for analyzing and solving urban metropolitan hydrologic problems through consideration of both the physical and social dimensions. This report is limited to the preliminary work of identification of social variables, the first steps in assigning mathematical values to them, and developing a mathematical format for these variables. In addition, the physical-hydrologic system is identified for purposes of clarifying the elements in that system. The ultimate objective of the entire study is directed toward discovering a theoretical and generally applicable mathematical model of both the physical and social dimensions involved in metropolitan flooding problems.
W74-10351

MANAGEMENT OF URBAN STORM RUNOFF,
Water Resources Engineers, Walnut Creek, Calif., and Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 5D.
W74-10395

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: ECONOMIC AND ENVIRONMENTAL IMPACTS OF SURFACE RUNOFF DISPOSAL SYSTEMS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6A.
W74-10397

SNOW ROAD CONSTRUCTION TECHNIQUE BY LAYERED COMPACTION OF SNOW-BLOWER PROCESSED SNOW,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 8G.
W74-10403

EFFECTS OF ROAD SALT IN WINTER,
Louvain Univ. (Belgium). Public Health Lab.
H. Van de Voorde, M. Nijs, and P. J. Van Dijck.
Environmental Pollution, Vol 5, No 3, p 213-218, 1973. 1 fig, 2 tab, 10 ref.

Descriptors: Rivers, Streams, Roads, *Highway icing, *Snow removal, *Salinity, *Chlorides, Water pollution sources, *Path of pollutants.
Identifiers: *Belgium(Dye River).

The effect of salt treatment of roads in winter was investigated by assaying the salt concentration in three streams and soils over a two year period in Louvain, Belgium. Salt increased the chloride concentration in the Dyle River, which crosses the city, and the Voer River, a rural stream, by nearly 20-30 mgl/liter for only 24 hr. The mean chloride concentration for the rivers is irregular. The fluctuations are due to rainfall diluting the salt. The chloride in the rivers originates principally from domestic sewage which gives fairly constant levels. The amount of the salt deposited on the banks of the roads filters down to the phreatic water locally increased the chloride concentration of the groundwater, but not to a concentration which can be considered harmful to the health of consumers. Other minor disadvantages of road salt are damage to ornamental vegetation and corroding effect on metallic surfaces. The hazards of the use of road salt are negligible compared with traffic safety benefits. (Merritt-FIRL)
W74-10460

PROBLEMS OF THE EFFECT OF HUMAN ACTIVITY ON WATER RESOURCES AND WATER REGIME (VOPROSY VLIYANIYA KHOZYAYSTVENNOY DEYATEL'NOSTI NA VODNYYE RESURSY I VODNYY REZHIM),
Gusudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
A. I. Chebotarev, and I. A. Shiklomanov.
Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, Chebotarev, A. I., and Shiklomanov, I.A., editors, Leningrad, 1973. 212 p.

Descriptors: *Water resources, *Streamflow, *Runoff, *Discharge(Water), *Human population, Urbanization, Urban sociology, Agriculture, Forestry, Watersheds(Basins), Slopes, Overland flow, Water balance, Groundwater recharge, Water utilization, Irrigation, Variability, Statistical methods, Computers, Foreign research.
Identifiers: *USSR.

The effect of man on formation and characteristics of streamflow was investigated in this collection of 8 papers prepared by Leningrad State Hydrologic Institute. Procedural problems of investigations are discussed, and attention is directed to an evaluation of the effects of channel regulation, irrigation, industrial and public water use, urbanization, and of a whole complex of human factors on such hydrologic characteristics of water bodies as annual and seasonal runoff, seasonal distribution of runoff, and peak discharge. (Josefson-USGS)

W74-10626

METHODS OF EVALUATING THE EFFECT OF A COMPLEX OF HUMAN FACTORS ON WATER RESOURCES AND WATER REGIME OF WATERSHEDS (O METODAKH OTSENKI VLIYANIYA KOMPLEKSA FAKTOROV KHOZYAYSTVENNOY DEYATEL'NOSTI NA VODNYYE RESURSY I VODNYY REZHIM VODOSBOROV),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
I. A. Shiklomanov.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i vodnyy rezhim; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 3-21, Leningrad, 1973. 1 fig, 47 ref.

Descriptors: *Watershed management, *Watersheds(Basins), *Water resources, *Human population, Runoff, Water balance, Heat balance, Correlation analysis, Regression analysis, Computers, Computer programs, Equations, Evaluation.
Identifiers: *USSR.

Basic types of human activity which have the greatest effect on water resources and water regime of basins are: (1) reservoir construction; (2) irrigation and flooding of dry lands; (3) drainage of bogs and saturated soils; (4) land- and forest-improvement practices; (5) industrial and public water use, water withdrawals, and alteration of flow; (6) urbanization; and (7) mining operations and large groundwater withdrawals. Current methods used to evaluate the effect of man on hydrologic characteristics are included in two basic trends of investigations: (1) study of long-term fluctuations of runoff at key gaging stations and analysis of changes in meteorological factors and in development of human activities in basins; and (2) study of individual items in water and heat balances directly in watershed areas where formation and runoff of surface waters and groundwaters are influenced by man. Advantages and disadvantages of the two methods are analyzed. On the basis of investigations and summarization of sources in the literature, recommendations are made for developing effective methods of evaluating changes in hydrologic characteristics as a result of human activity. A program of calculations by BESM-4 digital computers based on the method of multiple linear correlation is described, and possibilities of expedient application of this program in investigations and calculations are discussed. (See also W74-10626) (Josefson-USGS)
W74-10627

IRRETRIEVABLE RUNOFF LOSSES OF THE VOLGA RIVER THROUGH EVAPORATION FROM RESERVOIRS OF THE VOLGA-KAMA CASCADE (BEZVOZVRATNYYE POTERI STOKA R. VOLGI ZA SCHET ISPARENIYA S VODOKHRANILISHCH VOLZHSKO-KAMSKOGO KASKADA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4A.
W74-10628

CALCULATION OF GROUNDWATER RECHARGE AND EVALUATION OF THE EFFECT OF LAND- AND FOREST-IMPROVEMENT PRACTICES (RASCHET PITANIYA GRUNTOVYKH VOD I OTSENKA VLLYANIYA NA NEGO AGROLESOMELIORATIVNYKH MEROPRIYATIY),
Gosudarstvennyii Gidrologicheskii Institut, Leningrad (USSR).
V. Ye. Vodogretskiy.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i vodnyy rezhim; Gosundarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 52-91, Leningrad, 1973. 8 fig, 5 tab, 29 ref.

Descriptors: *Groundwater recharge, *Groundwater, *Land reclamation, *Forest management, *Watershedsbasins), Shelterbelts, Aquifers, Water table, Water levels, Water level fluctuations, Groundwater movement, Drawdown, Water wells, Water balance, Precipitation(Atmospheric), Water yield, Seasonal, Curves, Equations.
Identifiers: *USSR.

Present methods of determination of groundwater recharge are discussed, and procedures are outlined for calculation of groundwater recharge by rainfall penetration at individual points on a watershed. Changes in amount of groundwater recharge under the effect of fall plowing and forest cover during years of variable moisture are analyzed, and results of analysis are applied to different natural zones in European Russia and Northern Kazakhstan. Accuracy of computation of groundwater recharge depends on: (1) accuracy of measurement of groundwater levels; (2) accuracy of determination of groundwater yield in the zone of groundwater level fluctuations; (3) accuracy of calculation of groundwater discharge into water intakes by an indirect relation of the amount of depletion of groundwater storage in winter to groundwater level fluctuations. Major factors influencing the degree of variability of groundwater recharge under the effect of land- and forest-improvement practices in watersheds are atmospheric precipitation, soil particle size in the zone of aeration, soil lithological structure, and depth of groundwater occurrence. (See also W74-10626) (Josefson-USGS)
W74-10629

EVALUATION OF THE EFFECT OF HUMAN ACTIVITY ON RUNOFF OF LARGE RIVERS IN THE CAUCASUS (KURA, TEREK, KUBAN') (OTSENKA VLIYANIYA KHOZYAYSTVENNOY DEYATEL'NOSTI NA STOK KRUPNYKH REK KAVKAZA (KURA, TEREK, KUBAN')),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
I. A. Shiklomanov, and L. Ye. Smirnova.
In: Voprosy vliyaniya khozyaystvennoy dayatel'nosti na vodnyye resursy i vodnyy rezhim; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 92-121, Leningrad, 1973. 7 fig, 11 tab, 18 ref.

Descriptors: *Runoff, *Discharge(Water), Rivers, *River basins, *Human population, Irrigation, Irrigated land, Water balance, Low flow, Seasonal, Annual, Variability, Correlation analysis, Regression analysis, Computers, Equations.
Identifiers: *USSR, *Caucasus Mountains, *Kura River(USSR), *Terek River(USSR), *Kuban' River(USSR).

Variability of annual runoff and of runoff during the growing season (April-October) under the effect of man was investigated in the Kura, Terek, and Kuban' River basins in Transcaucasia and the Northern Caucasus. The basic form of human activity in lowland areas is irrigated agriculture. During the last 40 years irrigated lands in the Kura-Mingechaur basin increased 2.5 fold and reached 560,000 ha in 1970. During the last 10 years annual runoff in the basin decreased, on the average, by about 5% and runoff during the warm season, by about 8%. In low-water years reduction in runoff reaches about 15%-20%. A systematic reduction in runoff occurs in the Terek River basin, where irrigation is intensely developed. During the last 10 years annual runoff of the Terek River decreased by approximately 20% and seasonal runoff by 25%. Providing human activity in the basin continues at the same rate, runoff is expected to decrease by about 50% by 1985. Runoff at the outlet gaging station on the Kuban' River decreased insignificantly during the last 10 years, although in the low-water years of 1969 and 1970 reduction in runoff was considerable (up to 15%). Other, less important, anthropogenic factors contributing to increased runoff losses are channel, regulation, drainage agricultural practices, industrial and public water use, and urbanization. (See also W74-10626) (Josefson-USGS)
W74-10630

HYDROLOGIC ASPECTS OF URBANIZATION (GIDROLOGICHESKIYE ASPEKTY URBANIZATSII),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
V. V. Kupriyanov.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i vodnyy rezhim; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 122-133, Leningrad, 1973. 4 fig, 3 tab, 14 ref.

Descriptors: *Hydrologic aspects, *Urbanization, *Urban hydrology, *Urban sociology, *Urban runoff, Urban drainage, Cities, Suburban areas, Watersheds(Basins), Discharge(Water), Floods, Low flow, Sediment transport, Water balance, Precipitation(Atmospheric), Evaporation, Foreign research, United States, Curves, Equations.
Identifiers: *USSR.

The impact of urbanization on water regime of an area and on quantitative and qualitative estimates of changes in water resources is examined. This impact can be evaluated on the basis of changes in the hydrologic regime of urban and suburban areas and on the basis of the effect of towns on water balance of immediate urban vicinities. Runoff from urban areas differs sharply from runoff from natural watersheds. Annual runoff from urban watersheds is generally considerably greater than that from nonurban areas. A significant hydrologic impact of urban development is reflected in the magnitude, volume, and duration of peak discharge and in the increase or decrease in low flows. Sediment movement is especially important in an area during highway construction. A review of the effects of urbanization on the hydrologic regime was based mainly on data of observations in the United States. (See also W74-10626) (Josefson-USGS)
W74-10631

IMPACT OF URBANIZATION ON QUALITY OF RIVER WATER (VLIYANIYE URBANIZATSII NA KACHESTVO RECHNYKH VOD),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 5B.
W74-10632

PRELIMINARY ESTIMATE OF THE EFFECTS OF IRRIGATED AGRICULTURE ON STREAMFLOW IN THE LAKE BALKHASH BASIN (PREDVARITEL'NAYA OTSENKA VLIYANIYA OROSHAYEMOGO ZEMLEDELIYA NA RECHNOY STOK V BASSEYNE OZ. BALKHASH),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
A. B. Zavodchikov.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i Leningrad, 1973. 7 fig, 2 tab, 21 ref.

Descriptors: *Lake basins, *Streamflow, *Runoff, *Agriculture, *Irrigation programs, Irrigation systems, Irrigation practices, Irrigation water, Return flow, Rates of application, Precipitation(Atmospheric), Air temperature, Evaporation, Transpiration, Runoff coefficient, Watersheds(Basins), Rivers, Correlation analysis, Regression analysis, Curves, Estimating.
Identifiers: *USSR, *Lake Balkhash.

The effect of irrigation on seasonal distribution of runoff into Lake Balkhash was investigated. Major rivers flowing into the lake are the Ili, Karatal, Aksu, Lepsy, and Ayaguz with a total annual runoff of about 18 cu km. The proportion of

Ili River runoff is 75-80% or approximately 14 cu km. Investigations were carried out on the Ili River, Karatal River and its left-bank tributary--the Koksu, and on the Lepsy and Sarkand Rivers. Under the present system and intensity of irrigation in these and most other river basins, there is no marked reduction in mean annual runoff. However, irrigation may have some effect on runoff of the Karatal and Lepsy Rivers in whose basins irrigation is strongly developed. During the last 10 years runoff of these rivers decreased by approximately 15-20%, and reduction in mean annual runoff was 5-7%. Runoff of the Ili River remained practically the same, except for the period 1961-1970. (See also W74-10626) (Josefson-USGS)
W74-10633

OVERLAND FLOW AND ITS VARIABILITY UNDER THE EFFECT OF AGRICULTURAL AND FOREST-IMPROVEMENT PRACTICES (SKLONOVYY STOK I YEGO IZMENENIYE POD VLIYANIYEM AGROTEKHNICHESKIKH I LESOMELIORATIVNYKH MEROPRIYATIY),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4A.
W74-10634

DRAINAGE OF LEVEL OR NEARLY LEVEL ROADS,
Transport and Road Research Lab., Crowthorne (England). Structural Properties Div.
A. C. Whiffin, and C. P. Young.
Available from NTIS, Springfield, Va 22161 as PB-228 129 Price $5.25 printed copy; $2.25 microfiche. Report LR 602, 1973. 37 p, 9 fig, 11 tab, 4 ref, 5 append.

Descriptors: *Road design, *Urban hydrology, *Storm runoff, Drainage systems, Storm drains, Equations, Steady flow, Slopes, Outlets.
Identifiers: *Road drainage.

The drainage of surface water from roads of constant crossfall is analyzed. This may involve a channel of constant depth along the lower edge with outlets at regular intervals, or a channel formed by a raised curb with outlets at regular intervals. Because the theoretical equations are comparatively complex and not suitable for use in design offices, the results were analyzed statistically to give a simpler formula. Tables are provided which give the solutions for a wide variety of conditions. (Knapp-USGS)
W74-10660

4D. Watershed Protection

EROSION OF THE NORTH SHORE OF LONG ISLAND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 2J.
W74-10440

EROSION CONTROL SAVES SOIL NUTRIENTS,
Agricultural Research, Vol 22, No 7, p 6-7, January, 1974. 1 fig.

Descriptors: *Erosion control, *Contour farming, *Cover crops, Erosion, Soil conservation, Soil management, *Terracing, Vegetation establishment, *Surface runoff, *Nutrient removal.

The application of soil erosion control methods in eliminating fertilizer nitrogen and phosphorus as pollutants in surface runoff is described. In a three-year study on adjacent watersheds near Treynor, Iowa, it was demonstrated that when corn was fertilized at two and a half times the recommended rate, only one thirteenth as much nitrogen and one tenth as much phosphorus was lost in runoff when erosion was effectively restricted as when it was not. The corn was grown on the watershed protected by level terraces, on two watersheds farmed on the contour, and on a fourth watershed which was bromegrass pasture. Terracing was the more effective means of restricting runoff and soil erosion on cropped land. Average annual loss of nitrogen in all forms was 28.8lb/ acre with contouring, 2.7lb with terracing, and 2.1lb with grass. Significantly, 92% of the total nitrogen loss from contour-farmed watershed, and 86% from the terraced watershed, was associated with sediment. A critical period for nutrient losses was during seedbed preparation and the establishment of crop. Differences in phosphorus losses from the four watersheds were similar to those for nitrogen. (Merritt-FIRL)
W74-10456

ADJUSTABLE WATER LEVEL AND EROSION CONTROL DEVICE,
For primary bibliographic entry see Field 3F.
W74-10589

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

SALINE GROUNDWATERS PRODUCED WITH OIL AND GAS,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
A. G. Collins.
Copy available from GPO Sup Doc as EP1.23:66012-74-010, $1.15 paper copy; microfiche $2.25 from NTIS, Springfield, Va 22161 as PB-234 385. Environmental Protection Agency, Technology Series Report EPA-660/2-74-010, April 1974. 68 p, 19 fig, 10 tab, 20 ref, 2 append. Project EPA 16060 EQQ.

Descriptors: *Data processing, *Data storage and retrieval, *Saline water, *Brines, Connate water, Desalination, Descaling, Saline water systems, Water pollution sources, Encroachment, *Oil wells, Saline water intrusion, Aquifers, Groundwater, Subsurface waters, Water chemistry, Water reuse, *Salts, *Mapping, Subsurface mapping, Distribution patterns, *Brine disposal injection wells, Pollutant identification, Data collections.
Identifiers: *Recovery(Minerals), Recovery costs, Saline groundwater, *STORET system.

More than 60,000 saline water analyses were collected by the U.S. Bureau of Mines for entry into an automatic data processing system. Screening of the data eliminated 30,000 analyses; 20,000 were entered into STORET, the data processing system formulated by the Environmental Protection Agency. The water analyses are used in studies related to identifying the source of a brine, classification of groundwater for use in geochemistry, plotting local and regional salinity maps, determining sources of pollution of freshwater and land by brines, and studies of the use of saline water for desalination to produce freshwater and valuable minerals. Examples of each of these studies are given. Irresponsible control of brines can seriously pollute freshwater and land. The analyses now in STORET should be wisely used in pollution prevention programs. Additional analyses should be entered into STORET to aid groundwater and land pollution prevention programs. The most important factores are the potentials that exist for using the data in studies related to pollution abatement and exploration for minerals. (EPA)
W74-10411

MEASUREMENTS OF THE DISTRIBUTION AND VOLUME OF SEA-SURFACE OIL SPILLS USING MULTIFREQUENCY MICROWAVE RADIOMETRY,
Hulbert (E.O) Center for Space Research, Washington, D.C. Space Sciences Div.
For primary bibliographic entry see Field 5B.
W74-10429

MEASUREMENT OF ENVIRONMENTAL POLLUTION AND ITS SYSTEMIZATION,
Hitachi Ltd., Tokyo (Japan).
K. Sakai, J. Sasama, N. Matsui, K. Kashiwazako, and T. Arai.
Available from NTIS, Springfield, Va 22161 as N74-14266, Price $3.00 printed copy; $2.25 microfiche. Translation Report 294-73, of Hitachi hyoron (Hitachi Review), Vol 54, No 6, June 1972. 30 p, 11 fig, 4 tab, 8 ref.

Descriptors: *Instrumentation, *Monitoring, *Air pollution, *Water pollution, Pollutant identification, Pollution abatement, Regulation, *United States, *Measurement.
Identifiers: *Japan, *USSR.

Measuring instruments newly developed to comply with the requirements of regulations for the measurement of both air and water pollution in Japan, the USA, and the USSR are discussed. Some examples are given of their application in computer systems for overall pollution surveys. (Knapp-USGS)
W74-10438

DETERMINATION OF TRACES OF COPPER, LEAD, CADMIUM, NICKEL, ZINC AND IRON IN SILVER HALIDES BY PULSE POLAROGRAPHY,
Bologna Univ. Ciamician Chemical Inst. (Italy).
M. Taddia, M. T. Lippolis, and P. Lanza.
Electroanalytical Chemistry and Interfacial Electrochemistry, Vol 51, No 1, p 221-225, March, 1974. 2 fig, 1 tab, 12 ref.

Descriptors: *Trace elements, *Polarographic analysis, Copper, Lead, Cadmium, Nickel, Zinc, Iron, Methodology, *Pollutant identification.
Identifiers: *Silver halides, Pulse polarography.

A method is described for the analysis of traces of copper, lead, cadmium, zinc, nickel, and iron in silver halides by pulse polarography with the standard addition procedure. Copper, lead, cadmium nickel, and zinc were determined after oxine extraction. Iron was determined after dithizone extraction. For elements added at 6-1 ppm levels, the accuracy was better than 10%. (Merritt-FIRL)
W74-10447

THE EFFECT OF ACID CONCENTRATION ON THE DETERMINATION OF DICHROMATE VALUE,
Salford City Sewage Works(England).
T. Stones.
Water Pollution Control, Vol 78, No 1, p 121-124, 1974. 7 fig, 3 tab, 3 ref.

Descriptors: *Sewage, Methodology, Investigations, Acidity, Decomposition, Sulfuric acid, Industrial wastes, Oxidation, *Pollutant identification, Chromium.
Identifiers: *Dichromates, Potassium dichromate, *United Kingdom(England).

A procedure for the determination of the dichromate value of sewage was reinvestigated to avoid significant losses of dichromate due to decomposition. The procedure recommended that the volume of sulfuric acid used should be 1.2 times the aqueous volume, i.e., 54.5% of the total volume. Various amounts of water were added to a series of flasks containing 25 ml of N/4 potassium dichromate solution, 80 ml of sulfuric acid, and 10 ml of 0.63% W/V of silver sulfate in sulfuric acid. After refluxing for 2 hr, the residual amounts of dichromate were determined. The results show that the

decomposition of the dichromate, which begins when the acid concentration exceeds about 45% V/V, increases rapidly above 55% and is complete at 80%. Increasing the acid concentration leads to an elevation of the boiling point of the solution, and the breakdown of the dichromate was due to thermal decomposition. In determining the dichromate value of a sewage or an industrial waste water an appropriate correction must be made for the amount of dichromate decomposed. This will not be constant but will be dependent upon the amount of dichromate which is in excess of that required for oxidation. (Merritt-FIRL)
W74-10448

RAPID DETERMINATION OF THE PRESENCE OF ENTERIC BACTERIA IN WATER,
Atlantic Research Corp., Alexandria, Va.
R. P. Kenard, and R. S. Valentine.
Applied Microbiology, Vol 27, No 3, p 484-487, March, 1974. 3 fig, 10 ref.

Descriptors: *Bacteria, Analytical techniques, *Bacteriophage, Microbiology, Coliforms, *Enteric bacteria, Water sampling, *Pollutant identification.
Identifiers: *Coliphage, Virulent bacteria, Computer analysis, Fecal coliforms, Virulent bacteriophage.

A rapid and sensitive method is described for the detection of bacteria in water and various other natural substrates by the isolation of specific bacteriophage. By the addition of large numbers of the organism in question to the sample, the presence of virulent bacteriophage is demonstrated in as little as six to eight hours. Fecal coliform, total coliform, and total coliphage counts were determined for over 150 water samples from several geographical areas over a period of two years. Computer analysis of the data shows a high degree of correlation between fecal coliforms and the coliphage present in the samples. With a high correlation coefficient between fecal coliform and coliphage counts, predictions of the fecal coliforms may be made by enumeration of the phage. (Prague-FIRL)
W74-10449

ADVANCED X-RAY CRAWLER.
For primary bibliographic entry see Field 8C.
W74-10450

ATOMIC ABSORPTION SPECTROPHOTOMETER FACILITATES WATER ANALYSIS,
Water and Sewage Works, Vol 121, No 1, p 27, 45, January, 1974.

Descriptors: *Municipal water, Instrumentation, *Spectrophotometry, *New York, Municipal wastes, Metals, *Pollutant identification.
Identifiers: *Atomic absorption.

The use of atomic absorption spectrophotometer for analyzing water at the Ben Nesin Laboratory (New York) is described. The laboratory is one of seven which analyzes water from 18 reservoirs and four controlled lakes which supply New York City. At Ben Nesin, 40,000 samples a year are collected and 400,000 annual analyses performed, checking for 60 different substances, inclusive of heavy and trace metals. The atomic absorption technique is based on the fact that the atoms of an element will when vaporized, absorb radiation passed through them at specific wavelength limits which are different for each element. For the detection and measurement of most metals, the instrument vaporizes the sample by flame in an air-acetylene, or air-propane burner. Samples being tested for cadmium, copper, cobalt, nickel, and lead are extracted with sodium hydroxide and hydrochloric acid. Concentrated solutions are prepared for analysis of zinc, chromium, strontium, iron, and manganese. Silver, sodium, cadmium are run without concentration. The spectrophotometer is extremely reliable and sensitive, more so than automated monitoring systems. (Merritt-FIRL)
W74-10464

FLUID POLLUTION MONITORING APPARATUS AND METHOD,
H. S. Hayre.
U. S. Patent 3,791,200. Issued February 12, 1974. Official Gazette of the U. S. Patent Office, Vol 919, No 2, p 471, February 12, 1974.

Descriptors: Equipment, *Instrumentation, *Acoustics, *Patents, *Effluents, *Pollutant identification, Fluid mechanics.

A new and improved method and apparatus for monitoring fluids to determine the presence of pollutants in the fluids are described. The type and quantity of pollutants are identified by analysis of the acoustic impedance properties of the fluid. (Merritt-FIRL)
W74-10485

MICROBIOLOGICAL WATER SAMPLERS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 7B.
W74-10517

WATER QUALITY CRITERIA DATA BOOK - VOL. 5 - EFFECTS OF CHEMICALS ON AQUATIC LIFE,
Battelle Columbus Lab., Ohio.
For primary bibliographic entry see Field 5C.
W74-10541

LOW WINTER DISSOLVED OXYGEN IN SOME ALASKAN RIVERS,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
For primary bibliographic entry see Field 5B.
W74-10546

MULTIELEMENT ANALYSIS OF ENVIRONMENTAL SAMPLES BY SPARK SOURCE MASS SPECTROMETRY,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
C. E. Taylor, and W. J. Taylor.
Copy available from GPO Sup Doc as EP1.23:660/2-74-001, $0.65; microfiche from NTIS, Springfield, Va 22161 as PB-234 456, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-001, January 1974. 23 p, 5 fig, 5 tab, 4 ref. EPA Project 16ADN-22. Program Element IBA027.

Descriptors: *Mass spectrometry, *Trace elements, *Chemical analysis, *Analytical techniques, Water pollution, *Sediments, *Pollutant identification, Water analysis.
Identifiers: Spark source mass spectrometry, Computerized data system, Electrical detection.

A spark source mass spectrometer that uses electronic detection and a dedicated data analysis system was applied to a survey type trace analysis for chemical elements. Errors in the data system software were identified and corrected. Modifications to the system permit identification and quantitation of 72 elements at the part per billion level in water samples. (EPA)
W74-10547

EFFECTS OF COPPER, ZINC, AND CADMIUM ON SELANASTRUM CAPRICORNUTUM,
Idaho Univ., Moscow. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W74-10563

THE DESIGN OF SAMPLING PROGRAMMES FOR RIVERS AND EFFLUENTS,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 7A.
W74-10576

PROCESS INNOVATIONS.
Canadian Chemical Processing, Vol 58, No 3, p 8-10, March, 1974.

Descriptors: Analytical techniques, Water pollution sources, *Fluorescence, *Oil wastes, Oil spills, Rhodamine, Dyes, *Remote sensing, *Pollutant identification.
Identifiers: *Lasers.

Water pollution can be detected at night by a new airborne instrument. A blue light from a low-powered laser excites fluorescence in the target area, an eight-inch telescope focussed on this area collect the light. Optical filters are used to block the reflected laser light and select pertinent wavelengths from the fluroescent spectrum of the target. This light is converted to an electrical signal by a photomultiplier tube, processed and recorded on a strip chart. It has two advantages over other systems: it is small and light, and does not require a sample of the material to be identified. The apparatus has detected fluorescence from oil refinery wastes and pulpmills' settling ponds, as well as controlled spills of oils and dyes. The instrument has measured the fluorescence of water at ranges up to 75 meters and detected oil slicks from altitudes of 300 meters. It has also detected rhodamine dye and chlorophyll in open water, and lignin sulphonates in pulpmill ponds. At ground level, the system has been used to examine river water and on board a ship to monitor chlorophyll concentrations in Lake Erie. (Murphy-FIRL)
W74-10605

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 12-16. NORTH PACIFIC SLOPE BASINS, ALASKA, HAWAII, AND OTHER PACIFIC AREAS.
Geological Survey, Washington, D.C.
Available from Superintendent of Documents GPO, Washington, D.C. 20402 Price $3.05 paper cover. Water-Supply Paper 2100, 1973. 464 p, 1 fig, 39 ref.

Descriptors: *Water quality, *Pacific Northwest U.S., *Surface waters, *United States, Dissolved solids, Streamflow, Solutes, Trace elements, Dissolved oxygen, Sediment load, Water temperaure, Water pollution, Hawaii.

Data are compiled on water quality in the North Pacific Slope Basins, Alaska, Hawaii, and other Pacific Areas of the U.S. The records of chemical analysis, water temperature, and suspended sediment of surface waters given in this volume serve as a basis for determining the suitability of waters for various uses. The records are listed by drainage basins in a downstream direction along the main stream. All stations on a tributary entering above a mainstream station are listed before that station. Descriptive statements are given for each sampling station where chemical analyses, temperature measurements, or sediment determinations have been made. These statements include location of the station, drainage area, periods of records available extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling station are included in most tables of analyses. (Knapp-USGS)
W74-10616

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PART 7. LOWER MISSISSIPPI RIVER BASIN.
Geological Survey, Washington, D.C.

Available from Superintendent of Documents GPO, Washington, D.C. 20402 Price $2.95 paper cover. Water-Supply Paper 2096, 1973. 438 p, 1 fig, 39 ref.

Descriptors: *Water quality, Mississippi River basin, *Surface waters, United States, Dissolved solids, Streamflow, Solutes, Trace elements, Dissolved oxygen, Sediment load, Water temperature, Water pollution.

The records of chemical analysis, water temperature, and suspended sediment of surface waters of the lower Mississippi River basin given in this volume serve as a basis for determining the suitability of waters for various uses. The records are listed by drainage basins in a downstream direction along the main stream. All stations on a tributary entering above a mainsteream station are listed before that station. Descriptive statements are given for each sampling station where chemical analyses, temperature measurements, or sediment determinations have been made. These statements include location of the station, drainage area, periods of records available, extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling station are included in most tables of analyses. During the water year ending September 30, 1968, the Geological Survey maintained 237 stations on 149 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 232 of these locations for chemical-quality studies. (Knapp-USGS)
W74-10617

EVALUATION OF A HOLLOW SPHERICAL CAVITY WITH A CIRCULAR APERTURE AS A REMOTE SENSOR OF ATMOSPHERIC INDEX OF REFRACTION,
Texas Univ., Austin. Antennas and Propagation Lab.
For primary bibliographic entry see Field 7B.
W74-10649

REMOTE SENSING REPORT, SAN FRANCISCO BAY AREA, APRIL-JULY 1972. VOLUME I.
National Field Investigations Center-Denver, Colo.
Available from NTIS, Springfield, Va 22161 as PB-227 834, Price $12.75 printed copy; $2.25 microfiche. Environmental Protection Agency Office of Enforcement report, April 1973. 186 p, 72 fig, 3 append.

Descriptors: *Remote sensing, *California, *Path of pollutants, Water pollution sources, Thermal pollution, Industrial wastes, Municipal wastes.
Identifiers: *San Francisco Bay.

An aerial remote sensing program was carried out in the San Francisco Bay Area in April and July 1972 to study water pollution. Location and description of industrial discharges were found during day and night-time periods. The presence of and dispersion patterns for the Bay area municipal sewage treatment plant (STP) discharges during day and night-time periods were documented. The flow patterns of Bay waters were mapped. (Knapp-USGS)
W74-10654

USE OF WHATMAN-41 FILTERS IN AIR QUALITY SAMPLING NETWORKS (WITH APPLICATIONS TO ELEMENTAL ANALYSIS),
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
H. E. Neustadter, S. M. Sidik, R. B. King, J. S. Fordyce, and J. C. Burr.
Available from NTIS, Springfield, Va 22161 as NASA TN D-7595 Price $3.75 printed copy; $2.25 microfiche. Technical Note NASA TN D-7595, May 1974. 61 p, 4 fig, 7 tab, 26 ref, 2 append.

Descriptors: *Sampling, *Air pollution, *Filters, Filtration, Monitoring, Suspended load, Chemical analysis, Equipment, Pollution identification.

A 16-site parallel high volume air sampling network compared glas fiber filters on one unit and Whatman-41 filters on the other. Sampler-to-sampler and filter-to-filter variabilities are small. Hygroscopic affinity of Whatman-41 filters need not introduce errors. Suspended particulate samples from glass fiber filters were slightly, but not statistically significantly, higher than from Whatman-41 filters. The results obtained demonstrate the practicability of Whatman-41 filters for air quality monitoring and elemental analysis. (Knapp-USGS)
W74-10666

MICROWAVE AND SPECTRA OF SOME SULFUR AND NITROGEN COMPOUNDS,
National Aeronautics and Space Administration, Langley Station, Langley Research Center.
W. F. White.
Available from NTIS, Springfield, Va 22161 as NASA TN D-7450 Price $4.50 printed copy; $2.25 microfiche. Technical Note D-7450, May 1974. 105 p, 3 fig, 7 ref.

Descriptors: *Chemical analysis, *Microwaves, *Sulfur compounds, *Nitrogen compounds, *Pollutant identification.
Identifiers: *Microwave spectroscopy.

Microwave absorption spectra suitable for chemical analysis are listed. Most of the measurements were made by a computer controlled, Stark modulated spectrometer in the frequency range 26,500 to 40,000 MHz, with a few spectra in the range 18,000 to 26,550 MHz. Measurements of absorption frequency, peak intensity, and integrated intensity are included along with experimental conditions, such as Stark field intensity, sample temperature and pressure, and microwave power level. Spectral data are given for the following compounds: acetonitrile, ammonia, 3-butenenitrile, carbon oxide sulfide, dimethyl disulfide, ethanamine, ethanethiol, ethylene glycol cyclic sulfite, formamide, hydrocyanic acid, isoxazole, methanamine, methanethiol, methyl sulfide, methyl thiirane, nitroethane, nitromethane, propanenitrile, 2-propenenitrile, 2-propene-1-thiol, pyridine, pyrrole, sulfur dioxide, tetrahydrothiophene, thiazole, thietane, thiirane, and thiophene. (Knapp-USGS)
W74-10683

MERCURY DYNAMICS IN A WARM WATER STREAM,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5B.
W74-10692

MECHANISM OF RESPIRATORY EXCHANGES IN AQUATIC ENVIRONMENT: A GENERAL REVIEW INCLUDING PERSONAL RESULTS,
Amiens Univ. (France). Laboratoire de Physiologie.
P. Harichaux, A. Poizot, and M. Freville.
Rev Int Oceanogr Med. 27 p 71-84. 1972. Illus.
Identifiers: Aquatic environment, Respiratory exchanges, Reviews, *Respiration, *Measurement, *Phosphorus compounds, Fish, Instrumentation.

Respiration in aquatic environment is reviewed. An original device for continuous measuring of PO2 and PCO2 variations in the aquatic environment of the fish is described. Oxygen consumption, according to factors intrinsic in fish (weight, species) or extrinsic in the aquatic environment (ambient temperature and chemical factors of pollution), can be computed.--Copyright 1973, Biological Abstracts, Inc.
W74-10713

ANALYSIS OF POLLUTANTS - PROPOSED TEST PROCEDURES.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 125, p 17318-17323, June 29, 1973.

Descriptors: *Regulation, *Measurement, *Administrative agencies, *Permits, Environmental sanitation, Federal government, Water pollution sources, Planning, Adoption of practices, Water conservation, Decision-making, Specifications, Data collections, Evaluation, Sampling, Testing, Test procedures, Water quality control, Sewage effluents, Waste water discharge, Pollutants.
Identifiers: *FWPCA Amendments of 1972, *Administrative regulations, Hazardous substances(Pollution).

The Environmental Protection Agency has proposed regulations pursuant to the Federal Water Pollution Control Act Amendments of 1972 setting forth required test procedures for the analysis of pollutants. The procedures were formulated as a result of extensive laboratory comparisons, both in-house and with extramural public and private participants. The use of other methods are permitted if they are approved by the Regional Administrator. Applicators for a permit may be required to submit analyses of pollutants. Prior to this, the Regional Administrator should be consulted on the acceptability of the procedures for measurements. A list of substances and their corresponding measurement techniques are delineated in the regulations. Comments, suggestions, and objections to the proposed regulations are invited. Eleven replicate analyses shall be performed on each of the three effluent samples collected during a twenty-four hour period of continuous discharge. One sample will contain the maximum amount of pollutant observed during the twenty-four hour period. A second will contain the minimum amount, and the third, an intermediate amount. (Sperling-Florida)
W74-10725

THE RAPS PROGRAM,
Environmental Protection Agency, Research Triangle Park, N.C. Chemistry and Physics Lab.
P. Hanst.
In: American Ordnance Association Proceeding of 3rd Meeting on Environmental Pollution Ma 17-18, 1972. Fort McNair, Washington, D.C., 1 151-162, 1973. 10 fig.

Descriptors: *Cities, *Air pollution *Investigations, Atmosphere, Smog, Monitoring Model studies, *Missouri.
Identifiers: *Regional Air Pollution Study, *St Louis(Mo), Atmospheric processes, Emissions Air pollution control.

The Regional Air Pollution Study (RAPS) is a five year program of air pollution research and is a continuation of research programs which have bee developing an understanding of atmospheri processes and techniques for air pollution contro It is mainly a study of transport and transforma tions of air pollutants with the intention to improv the scientific and engineering bases from whic optimum air pollution control strategies for urba areas can be devised. The concern is mainly wit photochemical smog. The basic photochemic reaction cycle of gaseous reactions in the lower a mosphere is illustrated. The particulate matter the most obvious portion of the pollution but it sti is the least understood. Smog particles are forme from gases; they do not fall out, but are remove mainly in the dissipation of the smog by mixin and diffusion and perhaps by evaporation. A emissions inventory is a prerequisite to developir an understanding of the transport and transform tion processes in any area. Descriptive and predi tive models are being developed to enable fair reliable forecasts of air pollution to be made. S Louis is the metropolitan area chosen for stud (See also W74-10765) (Jones-Wisconsin)

W74-10777

MARINE POLLUTION BY HYDROCARBONS IN THE NORTHERN ADRIATIC SEA,
Trieste Univ. (Italy). Inst. of Hygiene.
For primary bibliographic entry see Field 5B.
W74-10794

A MODIFIED PROCEDURE FOR THE TTC-DEHYDROGENASE TEST IN ACTIVATED-SLUDGE,
Agricultural Univ., Wageningen (Netherlands). Dept. of Water Purification.
A. Klapwijk, J. Drent, and J. H. A. M. Steenvoorden.
Water Research, Vol 8, No 2, p 121-125, 1974. 7 fig, 4 tab, 13 ref.

Descriptors: *Activated sludge, *Analytical techniques, Toxicity, Oxygen demand, Zinc, Phenols, *Pollutant identification, 2,4-D.
Identifiers: *TTC-dehydrogenase, Formazan, Cyanide.

The procedure for the determination of TTC-dehydrogenase activity of activated sludge has been critically examined with respect to the termination of the enzyme reaction, the extraction of formazan (TF), the exclusion of oxygen in the sample, the incubation temperature and the organic substrate used. The dehydrogenase activity measured by a modified TTC test correlates fairly well with oxygen uptake. Toxic substances such as zinc, phenol, cyanide and 2-4D do not influence the oxygen uptake and dehydrogenase activity to the same extent. (Murphy-FIRL)
W74-10817

THE DETERMINATION OF VEGETABLE AND MINERAL OILS IN THE EFFLUENTS AND SEWAGE SLUDGES OF THE UPPER TAME BASIN,
Upper Tame Main Drainage Authority, Birmingham (England).
M. Bennett, H. J. Dee, and N. Harkness.
Water Research, Vol 7, No 12, p 1849-1859, 1973. 6 fig, 3 tab, 20 ref.

Descriptors: Analysis, Analytical techniques, *Spectrophotometry, *Chromatography, Chemical analysis, *Oil, *Sewage sludge, *Pollutant identification.
Identifiers: Liquid-liquid extraction, Soxhlet extraction, *Thames River(U.K.).

A method for the quantitative analysis of vegetable and mineral oils in effluents and sewage sludges is described. The oils are extracted from acidified effluents by a liquid-liquid extraction, and from acidified dried sewage sludges by Soxhlet extraction using carbon tetrachloride as solvent. The vegetable oil is transesterified at room temperature, quantitatively estimated by gas-liquid chromatography, and neutralized. After separation of the methyl esters of the vegetable oils on a silica gel column, the mineral oils are qualitatively estimated by gas-liquid chromatographic 'fingerprinting' analysis, and quantitatively estimated by infrared spectrophotometric methods. (Murphy-FIRL)
W74-10818

DETERMINATION OF MERCURY IN WATER BY THE FLAMELESS ATOMIC ABSORPTION METHOD (HIGANY MEGHATAROZASA VIZBEN LANG NELKULI ATOMABSZORPCIOS MODSZERREL),
E. G. Harsanyi, L. Polos, L. Bezur, and E. Pungor.
Magyar Kemiai Folyoirat, Vol 79, No 11, p 471-476, November, 1973. 9 fig, 1 tab, 40 ref. English summary.

Descriptors: *Mercury, Metals, Water pollution, *Analytical techniques, Water pollution sources, *Pollutant identification.
Identifiers: *Atomic absorption, Flameless atomic absorption.

In comparison with other analytical procedures, the flameless atomic absorption method has a great advantage in the determination of small amounts of mercury in water and biological materials because of its simplicity and sensitivity. A system has been constructed in which mercury is reduced by tin (II) chloride, and the vapor is driven into the absorption cuvette by an air stream. In a volume of 100 cu cm water the detection limit was four nanograms with a reproducibility of 2-7 percent. An enrichment method has also been elaborated. It is based on the tin (II) chloride reduction technique. According to the procedure, mercury is reduced in a volume of 800 cu cm and driven into a 50 cu cm solution volume where it is absorbed under oxidative conditions. The mercury is then reduced in the smaller volume again with tin (II) chloride. The mercury vapor driven out from the solution is measured by the atomic absorption method. The detection limit of the technique has been found to be 0.008 ng/cu cm, its variation coefficient being four percent and the efficiency of the enriching operation 93 percent. (Murphy-FIRL)
W74-10819

CONFIRMATION STUDIES ON POLYCHLORINATED BIPHENYLS (PCB) FROM RIVER WATERS USING MASS FRAGMENTOGRAPHY,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
M. Ahnoff, and B. Josefsson.
Analytical Letters, Vol 6, No 12, p 1083-1093, 1973.

Descriptors: *Analytical techniques, *Mass spectrometry, Water pollution, Chlorine, *Polychlorinated biphenyls, Water pollution sources, *Pollutant identification.
Identifiers: *Fragmentography, Multiple ion defection.

A sensitive method for confirming the presence of polychlorinated biphenyls (PCB) in river water is detailed. Mass fragmentography is shown to be a helpful technique especially when using naturally-occurring stable isotopes of chlorine. Synthesized tetrachloro-, pentachloro- and hexachloro biphenyls were used to focus the mass spectrometer at the three selected masses, so-called multiple ion detection (MID). (Murphy-FIRL)
W74-10820

ARSENIC-CONTAINING CARBONATED WATERS, OCCURRENCE PECULIARITIES, CHEMICAL COMPOSITION, OCCURRENCE CONDITIONS (MYSH'YAKSODERZHASHCHIYE UGLEKISLYE VODY KAVKOZA (OSOBENNOSTI RASPROSTRANENIYA, KHIMICHESKIY SOSTAV, USLOVIYA FORMIROVANIYA)),
All-Union Scientific Research Inst. of Hydrogeology and Engineering Geology, Moscow (USSR).
For primary bibliographic entry see Field 2K.
W74-10884

5B. Sources Of Pollution

A GROUNDWATER QUALITY MODEL: A HYBRID COMPUTER SIMULATION,
California Univ., Los Angeles. School of Engineering and Applied Science.
T. M. Simundich.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 338; $8.75 in paper copy, $2.25 in microfiche. MS Thesis, 1971. 103 p, 22 fig, 30 ref, 3 append. OWRR B-150-CAL(16).

Descriptors: *Groundwater basins, *Hydrologic models, *Simulation analysis, Mathematical models, *California, Computer models, Water quality, Water pollution sources, *Dissolved solids.
Identifiers: *Raymond Basin(Calif).

A groundwater total dissolved solids (TDS) quality model is formulated for the saturated zone of an aquifer in a particular basin. The governing equations of the model are expressed as a computer program and are solved using the DSDT computer so as to yield a time and space description of the groundwater TDS quality of the basin. The model simulates the TDS quality behavior of the basin for a five year period. The following conclusions are reached: (1) A feasible, accurate mathematical groundwater TDS quality model of the basin was developed; (2) Distributed inputs dominate in a groundwater quality model for a near term period (less than 30 years); (3) Water TDS quality data are not adequate for the verification of a groundwater TDS quality model; (4) The DSDT method can be employed for implementing a groundwater TDS quality model for a small basin. Also, an investigation is made into a new modeling approach which maximizes the utility of the existing data of semi defined systems. This approach attempts to extract features from the prototype data which should be included in the model. However, it is concluded for groundwater TDS quality modeling this approach is of limited utility. (Snyder-California)
W74-10352

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 9 AND 10, COLORADO RIVER BASIN AND THE GREAT BASIN.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-10353

THE OXIDATION RATE OF SULPHIDE IN SEA WATER,
Goteborg Univ., (Sweden). Dept. of Analytical Chemistry.
T. Almgren, and I. Hagstrom.
Water Research, Vol 8, No 7, p 395-400, July 1974. 7 fig, 2 tab, 10 ref.

Descriptors: *Sulfides, *Oxidation, *Sea water, *Path of pollutants, Industrial wastes, Water chemistry, Dissolved oxygen, *Water pollution sources.

The order and rate of the oxidation of sulfide by oxygen in sea water at pH 8.0 and 8.5 were determined by computer processed potentiometric measurements made with an Ag/Ag2S membrane electrode. The reaction proceeds through a pseudo first-order mechanism when excess oxygen is present. The pH dependence is complex and probably influenced by catalysts. The microbial activity was briefly studied; no changes in reaction rate were observed between sterilized and non-sterilized samples. Bacteria do not take part in the rate-determining removal of sulfide. (Knapp-USGS)
W74-10365

DISTRIBUTION OF ARSENIC IN DEEP GROUNDWATER OF THE MIDDLE CASPIAN ARTESIAN BASIN (K VOPROSU O RASPREDELENII MYSH'YAKA V GLUBOKIKH PODZEMNYKH VODAKH SREDNEKASPIYSKOGO ARTEZIANSKOGO BASSEYNA),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Prirodnykh Gaza, Moscow (USSR)
V. N. Kortsenshteyn, A. P. Karaseva, and A. K. Aleshina.
Geokhimiya, No 4, p 612-617, April 1973. 3 fig, 2 tab.

Descriptors: *Geochemistry, Groundwater, *Groundwater basins, *Artesian aquifers, Confined water, Chlorine, Rocks, Geologic time, Sampling, Mapping.
Identifiers: *USSR, *Caspian Sea, *Arsenic, Balneology, Mineralization.

Arsenic concentrations in deep groundwater of the Middle Caspian artesian basin were determined in Jurassic rocks in Southern Mangyshlak and in Cretaceous strata in the Tersko-Sunzhenskaya zone of Eastern Ciscaucasia. Deep aquifer horizons within the Middle Caspian Basin contain relatively low arsenic concentrations, ranging from 0.01 to 1 mg/liter. On a general regional scale, arsenic content in the basin increases with depth from east to west, though the degree of increase varies locally. Arsenic concentrations in waters of Eastern Ciscaucasia tend to decreases as the chlorine content increases. The arsenic content in deep aquifer horizons of Eastern Ciscaucasia is greater than 0.7 mg/liter and the waters may be classified as therapeutic arsenic-bearing waters. Arsenic concentrations in artesian waters of Eastern Ciscaucasia and Southern Mangyshlak are tabulated. (Josefson-USGS)
W74-10379

RAIOCARBON IN GLACIAL WATER OF THE EL'BRUS REGION (RADIOUGLEROD V LEDNIKOVOY VODE PRIEL'BRUS'YA),
Akademiya Nauk URSR, Kiev. Institut Geokhimii i Fiziki Mineralov.
For primary bibliographic entry see Field 2K.
W74-10380

PROBLEM OF THE ORIGIN OF HYDROGEN SULFIDE IN NATURAL WATERS (K PROBLEME GENEZISA SEROVODORODA PRIRODNYKH VOD),
Ustredni Ustav Geologicky, Brno (Czechoslovakia).
R. Kvet.
Geokhimiya, No 4, p 625-628, April 1973. 17 ref.

Descriptors: *Geochemistry, *Hydrogen sulfide, Groundwater, *Sulfates, *Sulfur bacteria, Aerobic bacteria, Microbiology, Organic matter, Reduction(Chemical), Oxidation, Water pollution sources.
Identifiers: *USSR.

Hydrogen sulfide in natural waters is formed by the presence of sulfates, organic matter, and sulfate-reducing bacteria in a reducing medium and by their contact with oxidizing waters containing aerobic organisms. These organisms form a suitable organic substrate for sulfate-reducing bacteria through conversion of organic matter, unsuitable for direct use by these bacteria. Hydrogen sulfide in groundwater forms in hydrodynamically open structures such as regions of recent faulting of highly permeable rocks, which allow these two water types to come into contact. The presence of hydrogen sulfide in groundwater attests to the contact of an aquifer horizon with waters of the reducing medium and with waters in the zone of aeration. In manmade reservoirs, lakes, seas, and oceans, the formation of hydrogen sulfide and, most likely, the presence of reducing and oxidizing waters are also determined by their rate and direction of flow. (Josefson-USGS)
W74-10381

URANIUM AND SEDIMENTATION IN THE BLACK AND AZOV SEAS (URAN V PROTSESSE OSADKOOBRAZOVANIYA V CHERNOM I AZOVSKOM MORYAKH),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 2J.
W74-10383

MANAGEMENT OF URBAN STORM RUNOFF,
Water Resources Engineers, Walnut Creek, Calif., and Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 5D.
W74-10395

A MODEL FOR EVALUATING RUNOFF-QUALITY IN METROPOLITAN MASTER PLANNING,
Water Resources Engineers, Walnut Creek, Calif.; Hydrologic Engineering Center, Davis, Calif.; San Francisco City and County Dept. of Public Works, Calif.
For primary bibliographic entry see Field 5D.
W74-10396

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: ECONOMIC AND ENVIRONMENTAL IMPACTS OF SURFACE RUNOFF DISPOSAL SYSTEMS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6A.
W74-10397

POLLUTION ABATEMENT; DISPOSABILITY RATINGS OF PACKAGING MATERIALS USED ABOARD UNITED STATES NAVAL SHIPS,
Naval Ship Research and Development Center, Annapolis, Md. Materials Dept.
For primary bibliographic entry see Field 5G.
W74-10398

FLUSHING AND WATER QUALITY CHARACTERISTICS OF SMALL-BOAT MARINAS,
Washington Univ., Seattle. Dept. of Civil Engineering.
R. E. Nece, and C. R. Knoll.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 323, $3.75 in paper copy, $2.25 in microfiche. Completion Report No 40, June 1974. 58 p, 22 fig, 22 ref. OWRR A-064-WASH(2).

Descriptors: *Water pollution sources, *Water quality, Tidal waters, Biology, *Hydraulic models, *Marinas, Recreation facilities, Water temperature, Dissolved oxygen, Nitrates, Chlorophyll, Hydrogen ion concentration, Biomass.
Identifiers: *Tidal flushing.

Tide induced circulation patterns and gross flushing characteristics of two small-boat marinas are compared with field observations of currents and water quality within the marinas. Both marinas had comparable geometries, gross flushing characteristics, and water quality. There was not sufficient difference between the two marinas studied to verify how well small-scale hydraulic models may be used as predictors of overall quality within a particular marina. Water quality parameters sampled and reported for the period June-September, 1973, are temperature, dissolved oxygen, nitrate, pH, and chlorophyll a, the latter used as an index of total biomass in the water column. Comparable data were taken at a lake marina, for comparison between salt and fresh water environments. A sampling procedure is suggested for obtaining standardized descriptions of the quality of water within a marina as compared to the quality of water within a marina as compared to the quality of ambient waters. The suggested approach is conservative, being based on maximum detention times of water within the marinas, and incorporates sampling at that time on the tidal cycle when spatial variations in local exchange and water quality within the marina basin are minimum.
W74-10419

MEASUREMENTS OF THE DISTRIBUTION AND VOLUME OF SEA-SURFACE OIL SPILLS USING MULTIFREQUENCY MICROWAVE RADIOMETRY,
Hulbert (E.O) Center for Space Research, Washington, D.C. Space Sciences Div.
J. P. Hollinger, and R. A. Mennella.
Available from NTIS, Springfield, Va. 22161 as AD-762 753, Price $3.00 printed copy; $2.25 microfiche. Report No 7512, June 5, 1973. 9 p, 5 fig, 1 tab, 8 ref. NRL Problem G01-08.

Descriptors: *Remote sensing, *Microwaves, *Oil spills, Oil pollution, Radar, Aircraft, *Path of Pollutants, Oily water, Water pollution control, Distribution patterns, Pollutant identification.

Detection of oil spills by microwave measurements for aircraft was tested on eight controlled marine oil spills. Over 90 percent of the oil was generally confined in a compact region with thicknesses in excess of 1 mm and comprising less than 10 percent of the area of the visible slick. Microwave radiometry offers a means to measure the distribution of oil in sea-surface slicks and to locate the thick regions and measure their volome on an all-weather, day-or-night, and real-time basis. (Knapp-USGS)
W74-10429

THE FATE OF OIL SPILT AT SEA.
Central Dockyard Lab., Portsmouth (England).
Available from NTIS, Springfield, Va 22161 as AD-763 042, Price $4.50 printed copy; $2.25 microfiche. Ministry of Defense Working Party Report, 1973. 54 p, 4 fig, 7 tab, 58 ref.

Descriptors: *Oil pollution, *Oil spills, *Path of pollutants, Oily water, Evaporation, Oxidation, Biodegradation, Surveys, Bibliographies, Water pollution effects, Water pollution sources.

Oil spilled well away from land can travel great distances and still be a difficult problem when it eventually comes ashore. Methods for the early dispersion of such emulsions, possibly by inversion and progressive dilution, are vital if slicks are to be destroyed at an early stage. Processes which can contribute to the actual destruction or dissipation of an oil slick are evaporation, oxidation, solution, and dispersion as minute droplets. Dissemination of the oil in a finely divided and dilute condition renders it more susceptible to destruction by bacteria and intake by marine life. Loss by evaporation under static conditions at room temperature can range from about 33% for Tia Juana crude, to 36% for Kuwait and over 50% for Brega, while a residual oil fuel is virtually nonvolatile. The greater part of the oil spilled is accounted for by evaporation and by spreading to a thin film, while the remainder is in part dispersed in the water and in part left as an intractable residue. (Knapp-USGS)
W74-10434

MEASUREMENT OF ENVIRONMENTAL POLLUTION AND ITS SYSTEMIZATION,
Hitachi Ltd., Tokyo (Japan).
For primary bibliographic entry see Field 5A.
W74-10438

WASTE NEUTRALIZATION CONTROL - DIGITAL SIMULATION SPOTS NONLINEARITIES,
Cincinnati Univ., Ohio.
For primary bibliographic entry see Field 5D.
W74-10454

TWO SUSPECTS IN TASTE MYSTERY,
Water and Pollution Control, Vol 111, No 12, p 26-28, December, 1973.

Descriptors: *Canada, *Odor, *Taste, *Leachate, Landfills, Industrial wastes, *Aquifers, Streams, Water table, *Recharge, Groundwater.

Identifiers: *Ontario(Canada), Sabiston Well.

The source of noxious odors and a taste in the drinking water at Markham, Ontario, was investigated. The problem appeared to come from the Sabiston Well located 700 ft from an industrial refuse disposal site. Leachate migrating from the landfill was suspected as the cause. The groundwater quality around the site was studied to assess the direction of groundwater movement and determine whether contaminants were moving from the landfill to the wells. The Sabiston and two other wells drew water from a common aquifer which also stretched under the landfill. A stream flows over a portion of the aquifer and apparently recharges the aquifer. There were variances in the groundwater chemistry, particularly in chlorides and hardness. Due to changes in the level of the water table, the stream changed from being effluent to influent in the vicinity of the Sabiston Well. It is concluded that the water quality in the stream could have adversely affected the well. The contaminants could reach, and may have reached, the municipal wells. But the long travel time (estimated 1.4 ft/day) plus numerous variables and uncertainties make it difficult, if not impossible, to connect the landfill conclusively with the reported taste problem. (Merritt-FIRL)
W74-10459

EFFECTS OF ROAD SALT IN WINTER,
Louvain Univ. (Belgium). Public Health Lab.
For primary bibliographic entry see Field 4C.
W74-10460

COMMENT ON WATER POLLUTION IN LAKE MICHIGAN FROM POLLUTION AEROSOL FALLOUT,
Israel Atomic Energy Commission, Beersheba. Nuclear Research Centre-Negev.
D. Skibin.
Water, Air, and Soil Pollution, Vol 2, No 4, p 405-407, December, 1973. 10 ref.

Descriptors: *Air pollution effects, Pollutants, *Water pollution, *Lake Michigan, *Metals, Aluminum, Chromium, Iron, Sulfur, Winds, *Trace elements.

The hypothesis that air pollution is a major source of some water pollution trace elements in Lake Michigan was reexamined. Hazards evaluation techniques were used to assess the overall transfer efficiency of pollution from air to the lake. This efficiency was found to be at least 25% which supports the hypothesis. Four new trace elements were found: aluminum, chromium, sulfur, and iron. It is recommended that the problem be further studied, taking into account local mesoscale systems such as a lake breeze, distribution of air trajectory, and wind speed. (Merritt-FIRL)
W74-10461

2 RIVERS: VIRGINIA'S JAMES AND MARYLAND'S CHESTER.
Central Atlantic Environment Center, Washington, D.C.
Central Atlantic Environment News, Vol 3, No 9 & 10, p 1-12, September-October 1973. 2 map.

Descriptors: *Rivers, *Environmental effects, Dams, Channeling, Erosion, Water pollution , Water pollution sources, Sewage, Sewage disposal, Sewage treatment, Secondary treatment, Industrial wastes, Shellfish, Oysters, Recreation, Siltation, Flood control, Flood plain zoning, Pesticides, Dredging, Estuaries, Run-off, Land use, Land management, *Virginia, *Maryland.
Identifiers: *James River(Va), *Chester River(Md).

Like most rivers, the James River in Virginia carries the wastes of industries and the sewage of cities. But the James and its tributaries are also being extensively dammed, channelized and dredged. The result is massive, frequently short-sighted manipulation which is transforming the river as to degrade its remaining value and beauty. Intensely urbanized Richmond and Tidewater are heavy wastewater polluters of the James. Industrial pollution is another serious problem with more than 280 discharge points along the river's length. High coliform counts have closed much of the estuary to shellfish harvesting and a Corps of Engineers channel dredging project threatens the state's only natural bed for seed oysters. The Chester River in Maryland is likewise besieged by problems. Altered salinity levels, siltation and the presence of dangerous levels of coliform, organic matter, pesticide residues and trace metals all contribute to its degraded condition. Erosion, traditionally caused by wind and waves, has become more serious because farmers are plowing their field completely to the edge of the river bluffs. Unnecessary loss of land degraded water quality caused by turbidity, and silt are some of the penalities of land mismanagement. (Ritchie-Florida)
W74-10503

THE NORTH SEA,
Deutsches Hydrographisches Institut, Hamburg (West Germany).
G. Weichart.
Environment, Vol 16, No 1, p 29-33, January-February 1974. 3 fig, 4 tab, 5 ref.

Descriptors: *Estuaries, *Oceans, *Water pollution sources, *Water pollution, *Water pollution effects, Fallout, Oil wastes, Pollutant identification, Sewage effluents, Water resources, Impaired water quality, Public health, Waste water(Pollution), Waste dilution, Industrial wastes.
Identifiers: *North Sea.

The chemical processes of pollution in the North Sea are discussed. The southern region is more heavily polluted than the northern, mainly because the supply of pollutants in the south is the greatest and the dilution is the lowest, owing to the shallow water depths. An especially high rate of pollution occurs in the river estuaries, many coastal waters, the dumping areas and the principal shipping lanes. The discharge of phosphate and nitrogenous compounds are shown and rough estimates concerning the discharge of heavy metals and metaloids through the Rhine are given. Dumping of industrial wastes is estimated to comprise between 10 to 20% of the total pollution. Active shipping traffic is also a major problem as practically all their wastes are deposited without any treatment. The elimination of pollutants through watermass exchange with the Atlantic and natural reactions with bacterial decomposition is also discussed. (Sutton-Florida)
W74-10513

ACTIVATED SLUDGE - BIO-DISC TREATMENT OF DISTILLERY WASTEWATER,
American Distilling Co., Pekin, Ill.
For primary bibliographic entry see Field 5D.
W74-10525

A PREDICTIVE MODEL FOR SLUDGE CHARACTERIZATION USEFUL TO DESIGN AND CONTROL OF SLUDGE DEWATERING PROCESSES IN WATER RECYCLE SYSTEMS,
Maine Univ., Orono. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W74-10528

RECONNAISSANCE OF THE FLUSHING CHARACTERISTICS AND WATER QUALITY IN COASTAL CANALS OF THE GULF OF MEXICO,
University Southern Mississippi, Hattieburg.
O. L. Paulson, Jr., G. F. Pessoney, L. Massey, and D. Weaver.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 430, $3.00 in paper copy, $2.25 in microfiche. Mississippi Water Research Institute, Mississippi State, Completion Report, July 1974. 21 p, 2 fig, 4 tab, 22 ref. OWRR A-078-MISS(1).

Descriptors: *Canals, Water pollution, Marine biology, Canal design, *Water quality, *Gulf of Mexico, Regulation, *Dissolved oxygen, Florida, Texas, *Mississippi, Canal construction.
Identifiers: *Coastal canals, *Residential canals, *Flushing, *Pass Christian Isles(Miss).

The construction of residential canals, many of which are dead-end canals, in a coastal strip along the Gulf of Mexico has been the subject of great concern by regulatory agencies in the United States. The major concern is that construction of these canals may lead to degradation of water quality to the point where they are void of plant and animal life or that such developments result in the destruction of valuable nursery grounds for a number of organisms in the food chain of aquatic life. Discussions with numerous regulatory agencies in Florida and Texas, access to a limited number of published and unpublished reports, and the results of sampling during this investigation indicate that unfavorable conditions may develop because of the manner in which residential canals are constructed. It appears to be common practice to construct canals with a shallow area about midpoint of the canal, which results in a sink at the head or dead-end of the canal. This practice is thought to be largely responsible for the low dissolved oxygen measurements at those sites. Dissolved oxygen on the bottom at the head of three of the four canals sampled was from 2.0 to 3.0 mg/l. The only pattern observed for plankton and meiofauna was much larger numbers at the most saline of the four canal systems and smallest numbers at the freshest canal system.
W74-10531

MACROBENTHOS AS INDICATORS OF ECOLOGICAL CHANGE,
Lamar Univ., Beaumont, Tex. Dept. of Biology.
R. C. Harrel, J. Ashcraft, R. Howard, M. Welch, and R. Russell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 424, $3.75 in paper copy, $2.25 in microfiche. Completion Report, October 1973, 58 p, 6 fig, 4 tab, 32 ref. OWRR B-106-TEX(1). 14-31-0001-3655.

Descriptors: *Benthos, Impoundments, Path of pollutants, Salt water intrusion, Navigation, *Texas, *Clams, *Bioindicators, *Ecological distribution, Water pollution effects, Pollutant identification, Distribution patterns.
Identifiers: *Neches River(Tex), Rangia cuneata, *Ecological change, *Diversity indices.

The objective was to correlate community structure of benthic macroinvertebrate with ecological changes in a 30 mile section of the lower Neches River, Texas. The resulting information can be used to predict ecological effects of river basin development and serve as a reference for future studies. Physico-chemical conditions were measured according to standard methods; total oxygen demand was determined with an Ionic Total Oxygen Demand Analyzer. Macrobenthos were collected by dredge and artificial substrate samplers; community structure was determined in terms of numbers of species and individuals, indicator organisms, and diversity indices. The approximate area of the river inhabited by Rangia cuneata was 27.4 hectares (59.32 acres), with an average density of 220/m squared. The potential value of Rangia production in the Neches River and Pine Island Bayou is $39,744.00 annually for shell and meat. Hindering development of a Rangia fisheries is the presence of pollution in the clam producing area. The complex interaction of physical and chemical parameters, and industrial effluents in a changing salinity environment made it difficult to define

species which were good indicators of ecological change in the Neches River.
W74-10534

NTA AND MERCURY IN ARTIFICIAL STREAM SYSTEMS,
Georgia Univ., Athens. Inst. of Ecology.
H. J. Kania, and R. J. Beyers.
Copy Available from GPO Sup Doc as EP1.23:660/3-73-025, $0.70; microfiche from NTIS, Springfield, Va 22161 as PB-234 459, $2.25. Environmental Protection Agency, Ecological Research Series, Report EPA-660/3-73-025, February 1974. 25 p, 12 fig, 1 tab, 6 ref. EPA Program Element IBA023, Project 16050 GQQ.

Descriptors: *Heavy metals, Phosphates, Environmental effects, *Detergents, *Nitrolotriacetic acid, *Mercury, *Path of pollutants, Biodegradation, Water pollution effects.
Identifiers: *Artificial stream channels, Mosquitofish, Gambusia affinis.

Studies were conducted in six artificial stream channels to determine the fate of NTA (nitrilotriacetic acid, trisodium salt) added with and without sodium phosphate to these systems. In the two hour period required for a given water mass to traverse the channels, there was no appreciable amount of NTA or phosphate, even after a one month period of continuous input. Visible biological differences were noted between the various treatments. These differences may have been a result of pH alteration caused by the addition of the trisodium phosphate and NTA. In anticipation of a long term program involving the fate of mercury and possible mercury-NTA interactions, several modifications were incorporated into the artificial stream system. Based on the results of laboratory studies, a mercury removal system utilizing shredded rubber tires as obtained from commercial tire recapping firms, was constructed. Laboratory studies indicated that NTA did not influence the uptake of mercuric ion by the rubber. The presence of NTA did alter the uptake pattern and final concentration by mosquitofish, Gambusia affinis. (EPA)
W74-10538

LOW WINTER DISSOLVED OXYGEN IN SOME ALASKAN RIVERS,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
E. W. Schallock, and F. B. Lotspeich.
Copy Available from GPO Sup Doc as EP1.23:660/3-74-008, $0.85; microfiche from NTIS, Springfield, Va 22161 as PB-234 443, $2.25. Ecological Research Series Report EPA-660/3-74-008, April 1974. 33 p, 11 fig, 3 tab, 36 ref. EPA Project 21ARX, Program Element IBA021.

Descriptors: *Dissolved oxygen, *Alaska, Rivers, Winter, Seasonal, *Conductivity, *Alkalinity, *Hydrogen ion concentration, *Water temperature, Water quality standards, Arctic, Subarctic.
Identifiers: Yukon River(Alas), Chena River(Alas), Sagavanirktok River(Alas).

Water samples collected during the years 1969 through 1972, from 36 selected Alaskan rivers were analyzed for dissolved oxygen, pH, conductivity and alkalinity. Dissolved oxygen (D.O.) ranged from 0.0 to 15.3 ml/l (106 percent saturation); pH from 6.2 to 8.4; conductivity varied from 105 to 3000 (umho/cm); and alkalinity from 28 to 410 (mg/l). Severe D.O. depletion during winter was found in many river systems large and small, and located in a range of latitudes (70 deg N to 61 deg N). Sufficient data were collected on the Chena, Chatanika, and Salcha Rivers to reveal annual D.O. trends: near saturation during spring 'breakup' and fall 'freezeup' when water temperatures are near 0 deg C; somewhat lower D.O. concentrations during warm water summer periods; and yearly minimum concentrations during the winter (January-March) interval. Data indicate that D.O. depression begins in October and continues into February. D.O. from stations near the mouth of a river were generally depressed more than at upper stations. The latter trend was observed in the Ukon River which contained 10.5 mg/l (73 percent saturation) at the Canadian Border but only 1.9 mg/l (13 percent) near the mouth. pH gradually decreased in some rivers although alkalinity and conductivity increased. The depressed winter D.O. concentrations and low winter discharge in many Alaskan rivers are more severe and widespread than present literature indicates. Winter conditions may already limit aquatic organisms in some systems. (EPA)
W74-10546

SANITARY LANDFILL THREATENS LAKE.
Water and Pollution Control, Vol 112, No 3, p 12, March 1974.

Descriptors: *Landfills, *Lakes, *Damages, Erosion, Runoff, *Canada.
Identifiers: Berm, *Black Lake(Canada), *Dartmouth(Canada).

The threat of the sanitary landfill operation of Dartmouth to Black Lake is discussed. The landfill could destroy the lake if the landfill is allowed to continue without safeguards according to the Dartmouth Lakes Advisory Board (DLAB). The landfill is located in an area slated to have industries situated there in the future. The landfill operation is heading rapidly towards the lake and could soon be spilling into it unless protective measures are taken. There are plans to build an earth berm at the bottom of the mound of landfill, designed to protect the lake, but members of the DLAB do not think that will be sufficient. There is evidence that some erosion is taking place and if the berm is made of raw earth, soil runoff would occur in heavy rains. (Merritt-FIRL)
W74-10553

NO RADIOACTIVE FISH IN LAKE MICHIGAN.
For primary bibliographic entry see Field 5C.
W74-10561

STUDY OF CARBOHYDRATE SOLUBILIZATION FROM SEWAGE SLUDGES,
Holywell R. D. C. (Wales).
For primary bibliographic entry see Field 5D.
W74-10562

PROCESS INNOVATIONS.
For primary bibliographic entry see Field 5A.
W74-10605

THE HYDROLYSIS OF UREA IN RIVERS,
Water Pollution Research Lab., Stevenage (England).
M. J. Stiff, and D. K. Gardiner.
Water Treatment and Examination, Vol 22, No 4, p 259-268, 1973. 4 fig, 3 tab, 4 ref.

Descriptors: *Winter, *Ureas, Rivers, Laboratory tests, On-site investigations, Ice, *Hydrolysis, *Water pollution sources.
Identifiers: *United Kingdom, Airports.

Laboratory and field tests were conducted to establish whether the hydrolysis of urea might occur in rivers during winter conditions when urea would be used to prevent the formation of ice on airfield runways. The results show there is a likelihood that the hydrolysis of urea will take place in rivers in winter time. The rate of hydrolysis appears to depend on local conditions and at present not enough is known about the appropriate variables to make any generalization. Therefore, the rate at which hydrolysis would occur in any particular river can be estimated only by experiments involving the water and bottom deposits of that river. Because of the relatively short residence time of rivers in the United Kingdom it is unlikely that complete hydrolysis of urea will take place, in which case the urea nitrogen load would not appear as ammonia at waterworks intakes. Further hydrolysis could occur during residence in reservoirs, but quantification is possible only by examination of particular cases. In river waters examined there is invariably a measurable concentration of urea ranging from 0.01 to 1 mg N/liter. The addition of urea to rivers from airfields will not therefore introduce any substance foreign to river waters although it could lead to an unusually high concentration. (Merritt-FIRL)
W74-10608

TRITIUM WATER TRACING,
Atomic Energy Research Establishment, Harwell (England).
D. B. Smith.
Water Treatment and Examination, Vol 22, No 4, p 250-258, 1973. 2 fig, 4 ref.

Descriptors: *Tritium, *Analytical techniques, *Radioactivity techniques, *Radiochemical analysis, *Tracers, Rivers, Recharge, Mining, Mine drainage, Water pollution sources, Groundwater movement.

Tritium tracing techniques are a valuable tool for groundwater investigations. These techniques are reliable, practical, and complentary to other methods. Unique information about relatively long-term movement and the behavior of pollutants can be gathered from natural tritium measurements. Examples of tritium tracer studies are given for drainage of water from mines and for a river recharge investigation. (Murphy-FIRL)
W74-10615

MARITIME ACCIDENTAL SPILL RISK ANALYSIS: PHASE I: METHODOLOGY DEVELOPMENT AND PLANNING,
Operations Research, Inc., Silver Spring, Md.
R. M. Fortson, Jr., E. L. Holmboe, F. B. Brown, J. T. Kirkland, and P. M. Tullier.
Available from NTIS, Springfield, Va 22161 as AD-761 362 Price $5.45 printed copy; $2.25 microfiche. Technical Report 753 for U S Coast Guard, January 1973. 71 p, 18 fig, 10 tab, 7 append. DOT-CG-22, 326-A.

Descriptors: *Oil spills, *Channels, *Navigation, Water pollution control, Safety, Risks, Alternate planning.

A methodological approach and task plan is given for assessing alternative methods of reducing the potential risk caused by the spill of hazardous cargo as the result of vessel collisions and groundings. In addition to developing the overall study approach, preliminary analysis of ship and barge accidents in U.S. territoral waters and ports identifies types of accidents. A practical risk management system for the Coast Guard's role in Merchant Marine safety is the goal of this study. (Knapp-USGS)
W74-10619

IMPACT OF URBANIZATION ON QUALITY OF RIVER WATER (VLIYANIYE URBANIZATSII NA KACHESTVO RECHNYKH VOD),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
B. G. Skakal'skiy.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i vodnyy rezhim; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 134-145, Leningrad, 1973. 4 fig, 4 tab, 28 ref.

Descriptors: *Urban sociology, *Urbanization, *Water quality, *Surface waters, *Cities, Urban runoff, Precipitation(Atmospheric), Wastes, Industrial wastes, Domestic wastes, Pollutants, Water pollution, Chemical oxygen demand,

Biochemical oxygen demand, Water chemistry, Foreign research.
Identifiers: *USSR.

The proportion of urban population in the USSR increased from 48% in 1959 to 56% in 1970. Particularly noteworthy are the high rates of urbanization in such remote areas as Siberia and Kazakhstan and the rapid growth of large cities. By 1970, 221 cities had a population of over 100,000, and 11 cities had a population of over 1,000,000. Some aspects of the effects of urbanization on the chemical quality of natural surface waters are examined on the basis of Soviet and foreign investigations. The impact of an urban area on the quality of natural water is determined mainly by (1) discharge of urban industrial wastes; (2) discharge of domestic wastes and fecal waters; (3) contamination of atmospheric precipitation; and (4) contamination of surface runoff from an urban area. Changes in chemical quality of water bodies as a result of discharge of urban wastes are evaluated. (See also W74-10626) (Josefson-USGS)
W74-10632

ATS AMARGOSA TRACER STUDY - PROGRAM MANUAL,
Computer Sciences Corp., Las Vegas, Nev. Scientific Systems Dept.
A. P. Coston.
Available from NTIS, Springfield, Va. 22161 as NVO-412-1, Price $4.00 printed copy; $2.25 microfiche. Contract Report NVO-412-1, May 1973. 36 p. USAEC Contract AT(26-1)-412.

Descriptors: *Computer programs, *Tracers, *Path of pollutants, *Statistical methods, *Data processing, Statistics, Hydrologic data.

Using hydrologic data in card form, program ATS (Amargosa Tracer Study) reads the data and lists it in standard STATPAC format on tape. The STATPAC tape so created may consist of one or more data sets. The tape contains the concentrations of tritium, sodium, chloride, Rhodamine WT and specific conductance; date and time at which these concentrations were measured; normalized concentrations; floating point time; and the cumulative discharge for each set. The cumulative pumping discharge is calculated by obtaining the product of the pumping rate and the difference between the times the pump was turned on and off. The discharge is then plotted against Rhodamine WT, tritium, sodium, chloride, and specific conductance with the results output on microfilm. In the event there are two or more rates of discharge and two or more starting times, ATS provides overlay plots; cumulative discharge for each sample at each pumping rate is plotted against the various concentrations. Only normalized values of Rhodamine WT, tritium, sodium, chloride, and specific conductance are plotted. (Knapp-USGS)
W74-10638

ADSORPTION OF PHOSPHORUS BY LAKE SEDIMENT,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 5C.
W74-10642

TIME OF TRAVEL OF SOLUTES IN MISSISSIPPI RIVER FROM BATON ROUGE TO POINTE A LA HACHE, LOUISIANA,
Geological Survey, Baton Rouge, La.
L. A. Martens.
Louisiana Department of Public Works, Baton Rouge, Water Resources Technical Report No 9, 1974. 1 sheet, 7 fig, 2 ref.

Descriptors: *Tracers, *Path of pollutants, *Mississippi River, *Dispersion, *Mixing, Travel time, Solutes, Dye releases, Fluorescent dye, Streamflow, *Louisiana.

A water tracer was injected into the Mississippi River at Baton Rouge, La., in order to determine the travel times, the maximum concentrations, the dispersion characteristics, and the duration of the tracer cloud as it moved downstream past New Orleans, La. This study (1974) was made when the Mississippi River at Baton Rouge was approaching flood discharge with a stage of 31 feet and discharge of 800,000 cfs. Accidental spills on the lower Mississippi River occur most often as a result of navigation accidents; these incidents occur most often during periods of high flow. Therefore, it is under these circumstances that the behavior of solutes accidentally spilled into the river should be known. For higher discharges the relation between travel time and distance is essentially linear; however, because of tidal influence at lower discharges this relation becomes curvilinear. At Addis, 4 miles downstream from the injection point, the tracer had dispersed toward both banks and the cloud was approximately 1,400 feet wide. The water tracer had moved to within 400 feet of the left bank and to within 1,000 feet of the right bank. As the tracer moved through the first meander, at Longwood, 9 miles downstream, concentrations were greatest about 500 to 1,000 feet from the right bank. At Burtville, 16 miles downstream, concentrations were again highest near the center of the river. Vertical mixing was not complete at Addis; however, by the time the tracer had moved to Longwood and Burtville, concentrations at surface and depth were practically the same at each location. At New Orleans, after a travel time of 41 hours, the passage time (or the longitudinal dispersion) was 8 hours. (Knapp-USGS)
W74-10646

ONE-DIMENSIONAL ANALYSIS OF HEAT DISSIPATION IN A SIDEARM OF A COOLING LAKE,
Oak Ridge National Lab., Oak Ridge, Tenn.
L. Dresner.
Available from NTIS, Springfield, Va 22161 as ONRL-TM-4287 Price $3.25 printed copy; $2.25 microfiche. Report ORNL-TM-4287, October 1973. 19 p, 4 fig, 3 ref, append. AEC Contract W-7405-eng-26.

Descriptors: *Path of pollutants, *Thermal pollution, *Lakes, *Numerical analysis, *Computer programs, Water circulation, Heat budget, Heat transfer, Water temperature.

A simple one-dimensional theory was formulated to describe surface cooling in blind sidearms of cooling lakes. The theory is based on an extension of Schijf and Schonfeld's equations of motion for the steady, nonuniform flow of the two-layered system. A numerical program to facilitate the computations is listed and illustrative results are given. (Knapp-USGS)
W74-10651

CHEMICAL DATA FROM OREGON WATERS, 1972,
Oregon State Univ., Corvallis. School of Oceanography.
R. D. Tomlinson, L. Barstow, D. R. Standley, S. Williams, and L. I. Gordon.
Available from NTIS, Springfield, Va 22161 as AD-775 250. Price $4.75 printed copy; $2.25 microfiche. Data Report 56 (Reference 73-15), September 1973. 119 p, 3 tab, 22 ref. ONR Contract N00014-67-A-0369-0007.

Descriptors: *Nutrients, *Sea water, *Water chemistry, *Oregon, Sampling, Maps, Phosphates, Nitrates, Silica, Water temperature, Dissolved oxygen, Salinity, *Data collections.

Water chemistry data collected on six cruises made during the months May-October 1972 along the Oregon coast are presented as complete data listings and sequential surface data contour charts. The charts graphically display rapid changes in surface water characteristics on time scales as short as a few hours. The data collected are the concentrations of water temperature, dissolved oxygen, PO4, NO3, NO2, H4SiO4, and CO2. Each surface contour plot is presented with a corresponding chart giving sample locations. (Knapp-USGS)
W74-10652

OCEAN WASTE DISPOSAL IN THE NEW YORK BIGHT,
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
T. J. Achrem.
Available from NTIS, Springfield, Va 22161 as PB-224 983 Price $4.50 printed copy; $2.25 microfiche. Report 4460C1559, August 1973. 119 p, 10 fig, 6 tab, 53 ref. EPA Contract 68-01-0796.

Descriptors: *Waste disposal, New York, *Garbage dumps, Municipal wastes, *Sludge disposal, Water pollution sources, Regulation, Water pollution control, Water pollution effects, Estuaries.
Identifiers: *New York Bight.

Criteria are given for the control of ocean waste disposal in the New York Bight. An intensive field survey was conducted in the New York city metropolitan region during the spring of 1973. The topics surveyed include ocean dump site characteristics, their geographic location, type and volume of material dumped, method of disposal, description of disposal sites, monitoring procedures, local regulating agencies, estuarine economics, an extensive chronology of related major events, and alternatives and recommendations for ocean disposal in the New York Bight. (Knapp-USGS)
W74-10655

A PRELIMINARY ASSESSMENT OF THE ENVIRONMENTAL VULNERABILITY OF MACHIAS BAY, MAINE TO OIL SUPERTANKERS,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 5C.
W74-10656

PRELIMINARY STUDY OF THE QUALITY OF WATER IN THE DRAINAGE AREA OF THE JEMEZ RIVER AND RIO GUADALUPE,
Los Alamos Scientific Lab., N. Mex.
W. D. Purtyman, F. G. West, and W. H. Adams.
Available from NTIS, Springfield, Va 22161 as LA-5595-MS Price $4.00 printed copy; $2.25 microfiche. Informal Report LA-5595-MS, California University, April 1974. 26 p, 2 fig, 10 tab, 12 ref.

Descriptors: *Water quality, *New Mexico, *Geothermal studies, Water pollution sources, Surface waters, Groundwater, Test wells, Boreholes, Water chemistry, Basic data collections, Hydrologic data.
Identifiers: *Jemez River(N. Mex.), *Rio Guadalupe(N. Mex).

A preliminary study of the quality of surface waters and groundwater was made in the area of a proposed geothermal test hole in New Mexico. The study was made to establish background data prior to the geothermal experiment. Analyses are reported from 17 surface water stations, 15 mineral and thermal springs, and 53 groundwater stations (wells, test holes, and springs). A general description of sampling stations is presented with a brief description of the chemical quality of the water based on concentrations of dissolved solids. (Knapp-USGS)
W74-10658

MISSOURI RIVER HYDROLOGY (STREAMFLOW AND TEMPERATURE)--SIOUX CITY, IOWA TO RULO, NEBRASKA,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 2E.
W74-10659

DIFFUSION-INDUCED INSTABILITY IN MODEL ECOSYSTEMS: ANOTHER POSSIBLE EXPLANATION OF PATCHINESS,
Johns Hopkins Univ., Baltimore. Chesapeake Bay Inst.
A. Okubo.
Technical Report 86, (Reference 74-3), May 1974. 17 p, 1 fig, 18 ref.

Descriptors: *Diffusion, *Ecosystems, *Distribution patterns, Biological communities, Ecological distribution, Dispersion, Niches, Model studies.
Identifiers: Patchiness.

Because a diffusion process in an ecosystem tends to give rise to a uniform density of population in space, diffusion usually plays a general role of increasing the stability in a system of mixed populations and resources. However, diffusion may also induce an instability to a system which is basically stable without diffusion. Thus a system of two interacting and diffusing populations both being coexistent in a spatially uniform distribution, hence with no patterns, may exhibit an interaction-diffusion instability. The instability results in a form of biological waves in space and time, thus leading to a 'patchiness.' (Knapp-USGS)
W74-10662

THE STRANGE WORLD OF MISCIBLE DISPLACEMENT,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
R. G. Kazman, O. K. Kimbler, and W. R. Whitehead.
Preprint 2152, American Society of Civil Engineers, National Meeting on Water Resources Engineering, January 21-25, 1974, Los Angeles, Calif. 15 p, 8 fig, 15 ref. OWRR A-022-LA(1) and A-027-LA(2).

Descriptors: *Waste disposal wells, *Injection wells, *Hydrogeology, *Computer programs, Path of pollutants, Monitoring, Waste disposal, Waste water disposal, Saline water.

The injection of wastes into deep aquifers that are presently filled with saline water is a technically feasible method of long term removal of wastes from the surface environment. Accepted procedures now in use for the construction of waste injection wells are satisfactory. Waste injection projects should be based on adequate knowledge of the regional geology of the target aquifer: thickness, dip, faults that obstruct regional flow, and the density or density distribution of the native fluid in addition to porosity, permeability and storativity. A system of monitor wells can be devised so that the waste can be tracked and managed--measures can be taken to prevent the waste from reaching the biosphere. Computational procedures can yield the required information for the proper placement of wells for monitoring in specific hydrogeologic circumstances: when there is little or no pre-existing groundwater flow and the aquifer dip is small or negligible, and when the aquifer is horizontal and there is groundwater flow. (Knapp-USGS)
W74-10664

ALKALI AND ALKALINE EARTH METALS: DISTRIBUTION AND LOSS IN A HIGH SIERRA NEVADA WATERSHED,
California Inst. of Tech., Pasadena. Div. of Geological and Planetary Sciences.
For primary bibliographic entry see Field 2K.
W74-10667

HYDROLOGY OF LAKE TARPON NEAR TARPON SPRINGS, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2H.
W74-10673

SIMPLE METHOD FOR PREDICTING DISPERSION IN STREAMS,
Geological Survey, Bay Saint Louis, Miss.
R. S. McQuivey, and T. N. Keefer.
ASCE Proceedings, Journal of the Environmental Engineering Division, Vol 100, No EE4, Paper 10708, p 997-1011, August 1974. 5 fig, 1 tab, 16 ref, append.

Descriptors: *Dispersion, *Open channel flow, *Mixing, *Path of pollutants, Hydraulics, Rivers, Streams, Tracers, Mass transfer, Advection, Momentum transfer, Turbulent flow.

A simple method is given for predicting longitudinal dispersion coefficients from mean flow parameters. An analogy was used between the liinear one-dimensional flow equation and the linear one-dimensional dispersion equation to define a relation between the solute dispersion coefficient and the flow dispersion coefficient. The flow dispersion coefficient is calculated from mean flow parameters, thus allowing predictions of solute dispersion one the relation between the two is known. Dispersion coefficients calculated by the simple method were compared with observed values for 18 streams that cover a wide range in flow conditions. Standard error of estimate is 30%. (Knapp-USGS)
W74-10676

LITERATURE REVIEW ON RESEARCH STUDY FOR THE DEVELOPMENT OF DREDGED MATERIAL DISPOSAL CRITERIA,
Texas Univ., Dallas. Inst. for Environmental Studies.
G. F. Lee, and R. H. Plumb.
Army Engineer Waterways Experiment Station Contract Report D-74-1, June 1974. 145 p, 1 fig, 15 tab, 163 ref.

Descriptors: *Dredging, *Water pollution sources, Pollutant identification, *Waste disposal, Spoil banks, Bottom sediments, Laboratory tests, Water analysis, Water pollution control, *Path of pollutants, *Reviews.
Identifiers: *Dredging wastes.

A review of the literature on the release of chemical contaminants from dredged material and natural water sediment shows that the bulk chemical composition is not a useful index of potential environmental quality problems for waters that come in contact with the sediment. Chemical constituents exist in sediment in a wide variety of forms, many of which are not available to aquatic organisms. In addition, for deposited sediment, the primary factor often controlling contaminant release is the mixing or degree of agitation of the sediment with the overlying waters. A standard elutriate test could be used to detect potential water-column quality problems at the dredging and disposal sites. This test involves the mixing of one volume of the sediment which is to be dredged with four volumes of the disposal site water for a 30-min shaking period. A 1-hour settling period followed by appropriate filtration or centrifugation is used to determine the release of potentially significant chemical constituents from the sediment. A wide variety of factors could affect the results of the elutriate test. These factors include: solid-liquid ratio, time of contact, pH, dissolved oxygen concentration, agitation, particle size, handling of solids, characteristics of water and sediment, and solid-liquid separation. The standard elutriate test requires that if at any time the soluble chemical constituents of selected contaminants in the elutriate exceed 1.5 times the ambient concentration in the disposal site water, special conditions will govern the disposal of this dredged material. (Knapp-USGS)
W74-10686

MERCURY DYNAMICS IN A WARM WATER STREAM,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
K. L. Bainbridge, F. M. D'Itri, and T. G. Bahr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 545, $4.00 in paper copy, $2.25 in microfiche. Institute of Water Research, Michigan State University, East Lansing, Technical Report No. 39, November, 1973. 71 p, 3 fig, 8 tab, 56 ref, 3 append. OWRR A-051-MICH(3). 14-31-0001-3222.

Descriptors: *Mercury, Streams, Sediments, Fish, Crayfish, Benthos, Sewage, *Michigan, *Spectrophotometry, Treatment facilities, Pollutant identification, Water pollution sources, *Path of pollutants.
Identifiers: *Flameless atomic adsorption, *Red Cedar River(Mich).

Sediments, fish, crayfish, benthos, and water from the Red Cedar River were collected periodically from a well-defined reach of the river and analyzed for mercury using flameless atomic adsorption methods. Samples of sewage were taken from the East Lansing Sewage Treatment Plant and analyzed to determine the amount of mercury contamination to the river from this source. Levels of mercury in the sediments ranged from 0.04 ppm (dry weight) at the upstream sample site to 0.40 ppm at the downstream sample site. It was estimated that an average of 64.5 grams per day were being carried into the East Lansing Sewage Treatment Plant while an average 17.9 grams per day of this mercury were entering the Red Cedar River at the sewage treatment plant outfall. There was no evidence to suggest that mercury was entering the Red Cedar River from the Red Cedar Golf Course. Levels of mercury in fish ranged from 0.17 ppm (wet weight) to 0.72 ppm. Predator species of fish contained significantly higher concentrations of mercury in their flesh than grazers or bottom feeding omnivores species of fish.
W74-10692

THERMAL POLLUTION--A GROWING CONCERN,
Michigan Dept. of Natural Resources, Lansing.
For primary bibliographic entry see Field 5G.
W74-10698

TEST OF A NEW MODEL FOR THE KINETICS OF ADSORPTION-DESORPTION PROCESSES,
Utah State Univ., Logan. Dept. of Soils and Biometeorology.
For primary bibliographic entry see Field 5G.
W74-10742

THE WATERS OF MEROM: A STUDY OF LAKE HULEH. III. THE MAJOR CHEMICAL CONSTITUENTS OF A 54 M. CORE,
Yale Univ., New Haven, Conn. Osborn Memorial Labs.
For primary bibliographic entry see Field 2H.
W74-10763

OIL SPILLS, HAZARDOUS MATERIALS SPILLS, VESSEL PROTECTION, AND OCEAN DUMPING,
Edison Water Quality Lab., N.J.
For primary bibliographic entry see Field 5G.
W74-10772

SURFACE RUNOFF LOSSES OF SOLUBLE NITROGEN AND PHOSPHORUS UNDER TWO SYSTEMS OF SOIL MANAGEMENT,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
S. D. Klausner, P. J. Zwerman, and D. F. Ellis.

Journal of Environmental Quality, Vol 3, No 1, p 42-46, 1974. 4 fig, 4 tab, 15 ref. WP-01493-011 and 13020 DBP.

Descriptors: *Agricultural runoff, *Nitrogen, *Phosphorus, *Soil management, Nutrients, Agriculture, Rainfall-runoff relationships, Crops, Fertilization, Eutrophication, Rotation, *New York.
Identifiers: Aurora(New York).

Annual loss of soluble nitrogen and inorganic phosphorus from field plots, due to rainfall, was determined. Influence of a crop rotation, soil management practices and fertilizer rates was evaluated. The experimental area is composed of approximately 12 ha of a Lima-Kendaia soil association. The soil texture is silt loam and is moderately to somewhat poorly drained. A three-year crop rotation of corn, beans, and wheat were combined factorially with two levels of fertility and two soil management schemes and replicated twice. The crop rotation has persisted for 15 years and has gone through five cycles. The soil management variable had remained the same for each plot during this period. The data present the annual losses of soluble N and P in the liquid fraction of surface runoff, as a function of past soil management practices and present fertility levels. Mean annual surface runoff volumes were approximately twice as high from poorly managed soils than from well-managed soils. Except for heavy fall fertilization of N on poorly managed soils, total yearly accumulative N discharge in surface runoff did not exceed amount delivered in rainfall as measured over 10 months. Phosphorus losses exceeded the amount contained in rainfall. (Jones-Wisconsin)
W74-10789

METABOLIC CYCLES FOR TOXIC ELEMENTS IN AQUEOUS SYSTEMS,
Minnesota Univ., St. Paul. Freshwater Biological Research Foundation.
For primary bibliographic entry see Field 5C.
W74-10791

EXPERIMENTAL INVESTIGATIONS, AT LABORATORY (SIC), ON THE TRANSFER OF MERCURY OF MARINE TROPHIC CHAINS,
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 5C.
W74-10792

MARINE POLLUTION BY METALS AND THEIR ACCUMULATION BY BIOLOGICAL INDICATORS (ACCUMULATION FACTOR),
Trieste Univ. (Italy). Inst. of Hygiene.
For primary bibliographic entry see Field 5C.
W74-10793

MARINE POLLUTION BY HYDROCARBONS IN THE NORTHERN ADRIATIC SEA,
Trieste Univ. (Italy). Inst. of Hygiene.
L. Majori, F. Petronio, G. Nedoclan, and A. Barbieri.
Revue Internationale d'Oceanographie Medicale, Vol 31-32, p 137-169, 1973. 16 fig, 5 tab, 4 ref.

Descriptors: *Oceans, *Oil pollution, *Measurement, Sampling, Surface water, Distribution, Organic compounds.
Identifiers: *Hydrocarbons, *Adriatic Sea(Gulf of Trieste).

A method of measuring hydrocarbons on marine surface water is described. The method consists of sampling by a special funnel, extraction by hexane of the lipidic substance of the sample, quantitative measurement by thin layer chromatography of hydrocarbon in the extract, and elementary percentage analysis of carbon and hydrogen in the extracts. The results obtained by this method in the Gulf of Trieste during two surveys with a total of 700 samples in approximately 150 zones show a differential distribution of oil byproducts that is reproducible to a considerable extent, symmetrical in the log scale of pollution, and has a modal value of 2 kg/sq km, which is associated with an invisible layer. The pollution is visible on only 10% of the marine surface on which it exceeds 30 kg/sq km; rarely does it exceed this value. The reproducibility observed in the local distribution justifies the hypothesis that marine surface pollution by persistent hydrocarbons depends more on space than on time and leads to an almost stationary distribution which can be correlated with the prevailing persistence of pollution sources in the marine environment. The described method has sensitivity and accuracy, and is economically attractive. (Auen-Wisconsin)
W74-10794

DIEL OVERTURNING IN LAKES,
CH2M/Hill Redding, Calif.
S. L. Smith, and D. A. Bella.
Mimeograph, (1972). 27 p, 9 fig, 2 append, 15 ref. 3T2-WP-187-0351.

Descriptors: *Convection, *Diurnal, *Turnovers, *Heat transfer, Depth, Heat budget, Winds, Mixing.
Identifiers: *Diel overturn.

Effect of diel heating and cooling processes upon depth of diel overturn in lakes was investigated by application of a short term heat budget analysis during cooling periods and graphical determination of overturn depths. This approach attempted to determine quantitatively the significance of convective processes to the depth of diel overturn. Qualitative consideration was also given to effects of wind action and thermal gradients in the upper metalimnion. Because various algae exhibit different sinking velocities, depth of diel overturn in stratified lakes could play an important role in determining the predominant algal species. Diel temperature variations show that during the first half of the summer the diel overturn depths range from about 1.5 to 2.4 m. On the basis of a heat budget analysis, diel overturn depths due to convective mixing were found to range from 1.4 to 2.3 m. An examination of the wind effect upon the net heat loss during the nocturnal cooling period revealed that increased heat loss due to increased winds could have a significant effect upon the depth of the overturn. The influence of convection and wind mixing were dependent upon the stability of the upper metalimnion. (Jones-Wisconsin)
W74-10797

PHOSPHATES IN SEDIMENTS OF PAMLICO ESTUARY,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5C.
W74-10804

COMPUTER MODELING OF SEDIMENT AND PHOSPHORUS MOVEMENT INTO CANADARAGO LAKE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
G. F. Kling, and 10aG. W.
Cornell Agronomy Mimeo 74-11, 1974. 26 p, 9 fig, 4 tab, 5 ref.

Descriptors: *Sediment transport, *Phosphorus, Movement, Lakes, Eutrophication, Erosion control, Grassed waterways, Computer programs, Land use, Contour farming, Watershed management, *New York.
Identifiers: *Canadarago Lake(NY), Greenbelts.

A complete description of materials and methods necessary for the use of a sediment transport computer model is given. Maps illustrate sediment losses in the Canadarago Lake drainage basin, with sediment moving into and toward Canadarago Lake. Much of the phosphorus moves downslope on eroded soil particles. More than 50 tons of sediment per acre per year are lost from some ares. Soil loss was calculated for 4192 10-acre cells in the drainage basin. Sediment deposition as well as soil loss was considered for each computer cell. Movement of sediment and attached phosphorus was modeled from cell to cell until ultimate deposition in streams emptying into the lake. This calculated sediment transport model accounted for more than 90% of the variation of measured annual phosphorus losses. Via computer, effects of three proposed land use changes were simulated. Two changes involved zoning protective greenbelts of forest or grass along stream banks and lakeshores. The third change involved placing all farmland under contour strip cultivation. Zoning a 660-ft greenbelt of permanent pasture on both stream sides resulted in a predicted reduction of 15% in total sediment and 6% reduction in total phosphorus yield. (Jones-Wisconsin)
W74-10807

PLANT GETS NEW PROCESS,
Ecolotrol, Inc., Bethpage, N.Y.
For primary bibliographic entry see Field 5D.
W74-10815

STREAM GAGING BY CONTINUOUS INJECTION OF TRACER ELEMENTS,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 2E.
W74-10826

SANITARY LANDFILL LEACHATE INTERACTIONS WITH A CARBONATE-ROCK DERIVED SOIL IN CENTRAL PENNSYLVANIA,
Pennsylvania State Univ., University Park. Dept. of Geology and Geophysics.
B. E. Lane.
M Sc Thesis, March, 1969. 197 p, 50 fig, 22 tab, 31 ref, 3 append.

Descriptors: Carbonates, Mechanical properties, Soil types, Clay loam, Clays, Loam, Dolomite, Sandstones, Sands, *Soil water, Leachate, Leaching, Artificial recharge, Pollution, Landfills, *Sanitary fill, Solid wastes, Sanitary engineering, Bacteria, *Groundwater, *Pennsylvania, Water pollution sources.
Identifiers: Clay mineral x-ray analysis, Leachate quality, BOD concentration, Bacterial sampling.

The carbonate-rock derived residual soil at the State College, Pennsylvania sanitary landfill site was classified on the basis of its mechanical properties and was found to range from clay-loam (clayey) to loamy-sand (sandy). Three objectives of this investigation were: (1) to determine the quality of leachate produced from solid refuse derived largely from domestic sources, (2) to determine the change in quality of leachate with time since the fill was emplaced, and (3) to determine the time-rate change (renovation in leachate as it moved through a carbonate-rock derived soil). These objectives were fulfilled from a qualitative point of view, at least for the early history (9 months) of a sanitary landfill. By artificially recharging water to the emplaced refuse, leachate was produced in significant amounts sooner than it would have been under natural conditions in the absence of extensive surface runoff. This study demonstrated that the use of suction lysimeters to obtain soil water samples, in conjunction with chemical and physical analyses of the soil water, is an excellent technique for tracing the movement of pollutants in the soil adjacent to a sanitary landfill trench. (Campbell-NWWA)
W74-10827

THE DISTRIBUTION OF MINOR ELEMENTS BETWEEN COEXISTING CALCITE AND DOLOMITE IN THE GASPORT MEMBER OF

THE LOCKPORT FORMATION, LOCKPORT, NEW YORK,
New York State Univ., Buffalo.
For primary bibliographic entry see Field 2F.
W74-10861

BASIC DISPOSAL-WELL DESIGN,
Du Pont de Nemours (E.I.) and Co., Wilmington, Del. Engineering Service Div.
A. C. Barlow.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas, p 72-76, (1971). 4 fig.

Descriptors: *Injection wells, Injection, Waste disposal, Underground waste disposal, Design, *Waste disposal wells.
Identifiers: *Injection well completions, Disposal wells, *Disposal well design.

Two factors, safety and utility, are basic in the design of disposal wells. Disposal wells are two general types, those which are considered open-hole completions, and those which are normal completions. Open-hole completions are common in areas where disposal zones are in unconsolidated sands. These wells utilize gravel-packed screen sections and are generally similar in design to large-capacity wells. Other open hole completions are made in more competent disposal zones. In places where the disposal liquid may attack the formations, casing is required to complete the well. Tubing and packer requirements vary depending on the nature of the waste stream. Lined tubing is required in almost every case to avoid excessive corrosion. Tubing lining may be either sprayed-on plastic or thin gage metallic alloys swedged to the base metal. Packers must be made of the same materials as the tubing to insure longevity. In some wells, hydraulic seals are used rather than packers. Such installation is satisfactory if injection is always under pressure. In every case, safety of the injection-well installation is a paramount consideration. (See also W72-14480) (Martino-NWWA)
W74-10865

DEEP-WELL ACID DISPOSAL--PLANNING AND COMPLETION,
Halliburton Services, Duncan, Okla.
G. W. Ostroot, and J. Ramos.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas, p 77-84, (1971). 6 fig, 1 tab, 9 ref.

Descriptors: *Injection wells, *Underground waste disposal, Waste disposal, Geologic investigations, *Feasibility studies.
Identifiers: *Deep-well acid disposal, Injection well planning, *Injection well completions.

The increased use of deep-well disposal will require feasibility studies that include an analysis of the disposal reservoirs, and a detailed geologic study to determine the presence of faults or abandoned wells that could be a source of contamination of potable waters. Many of the cementing procedures used in the oil industry are also used in disposal wells; however, added precautions must be taken in the design of the casing and injection strings. These precautions include the use of materials that are resistant to chemical attack, such as special alloys and fiberglass. Oil-well cements may be used in wells where the effluent is organic - e.g., weak organic acids, sewage waste, ferric chloride, and chemically treated effluents having a pH of 6 or above. A formulation of cement and liquid resin will resist attack from dilute acid solutions. The latest development in resin compositions is a blend of epoxy resin and an inert filler. This resin system has shown considerable promise for use in cementing disposal wells. It is resistant to concentrated acidic and caustic effluents and provides excellent bonding properties to the tubular goods. (See also W72-14480) (Campbell-NWWA)
W74-10866

REQUIREMENTS FOR THE MONITORING OF INDUSTRIAL DEEP-WELL WASTE-DISPOSAL SYSTEMS,
Dow Chemical Co., Houston, Tex.
J. S. Talbot.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas, p 85-92, (1971). 16 fig, 5 ref.

Descriptors: Waste disposal, *Underground waste disposal, *Monitoring, *Telemetry, Injection wells, Industrial waste.
Identifiers: *Waste injection monitoring.

The three principal areas of interest in monitoring subsurface injection are: (1) the well, (2) the surface equipment, and (3) the subsurface. Minimum monitoring requires measurement of the wellhead injection pressure and injection tube-casing annulus pressure; definition of corrosion effects of the waste; bottomhole monitoring of injection pressures; and, the location of a conductor-insulator interface. Monitoring of surface equipment should include records of injection-pump discharge pressure; the rate and cumulative measurement of the injected volume; injecta temperature and quality and, the corrosive effects of the injecta upon the construction materials. An occasional monitoring requirement is the drilling of one or more wells to the disposal formation to obtain formation pressures and fluid samples. This technique may be economically feasible when disposal is into relatively shallow formations. (See also W72-14480) (Staplin-NWWA)
W74-10867

DEEP DISPOSAL SYSTEMS FOR RADIOACTIVE WASTES,
Office of Environmental Affairs (AEC), Washington, D.C.
W. G. Belter.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas, p 341-351, (1971). 15 ref.

Descriptors: *Radioactive waste disposal, Radioactive waste, Underground waste disposal, Tritium, Krypton radioisotopes, Injection wells, Waste disposal wells, *Kansas.
Identifiers: Salt-mine repository, Lyons(Kan).

The Atomic Energy Commission has adopted a regulatory policy which requires that all high-level wastes from licensed irradiated-fuel-reprocessing plants must be solidified and shipped to a national repository on land owned and controlled by the federal government. A tentative selection of a site near Lyons, Kansas, has been made for an initial salt-mine repository for the demonstration of long term storage for both solid high-level and long-lived alpha-contaminated wastes. Because of general requirements for adequate monitoring to assure the safe and effective operation of a deep-well injection system, this method has not been used generally for disposal of radioactive wastes. It appears that injection into deep permeable formations may be a practical solution for the disposal of large quantities of tritium-bearing wastes from water reactors and nuclear-fuel-reprocessing plants in the future. Additional research is also required on the potential deep disposal of noble gases such as krypton-85 from reactor and reprocessing plant off-gas streams. (See also W72-14480) (Campbell-NWWA)
W74-10869

LIABILITY FOR HARM FROM UNDERGROUND WASTE DISPOSAL,
Wyoming Univ., Laramie.
F. J. Trelease.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas, p 369-375, (1971). 34 ref.

Descriptors: *Underground waste disposal, *Legal aspects, Trespass, Damages.
Identifiers: *Liability.

The general principles of civil liability for conduct which harms a person are that such a person must show a legal injury to a right protected by law, caused by an act of the defendant which the law regards as wrong. The four theories of tort law most likely to be applied in a case of harm from underground waste disposal are (1) trespass, an intentional invasion of the physical property of the plaintiff; (2) negligence, the causing of harm through failure to use reasonable care to avoid injury; (3) nuisance, the use of property so as to cause unreasonable interference with the use and enjoyment of another's property; and (4) strict liability, imposed without regard to fault upon those who engage in abnormally dangerous activities. The plaintiff's remedies are damages and injunction. The actor has few defenses other than to attack the theory of the plaintiff for lack of an element of his case. The new trend in law is toward conditional fault, which permits desirable conduct although it carries possibilities of harm, but which requires the actor to pay if harm occurs. (See also W72-14480) (Staplin-NWWA)
W74-10870

REGULATION OF SUBSURFACE DISPOSAL IN TEXAS,
Texas Water Development Board, Austin.
R. Hill.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas. p 381-385, (1971). 2 fig.

Descriptors: *Underground waste disposal, Well permits, *Well regulations, Injection wells, Disposal wells, *Legal aspects, Texas.
Identifiers: Texas Water Quality Board, *Texas Injection Well Act.

To begin drilling an injection well, or to convert an existing well into an injection well, a permit must be obtained from the Texas Water Quality Board. If the injection well is to be used for the disposal of waste arising from the production of oil or gas, the permit must be obtained from the Texas Railroad Commission. An application must be accompanied by a letter from the Railroad Commission stating that the well will not endanger any oil or gas resources. The Water Quality Board is required to send copies of each application to the Texas Water Development Board, the Texas State Department of Health, and the Texas Water Well Drillers Board. Each application is reviewed by the technical staff of the Board and recommendations for approval or denial of the application are given. An approval to drill an injection well is granted when it has been determined that disposal injection will have less effect on the environment than other means of disposal, that the well will not impair existing rights, and that water pollution will not occur. The permittee must report on the well-head injection pressures and on the volume and quality of waste injected. (See W72-14480) (Martino-NWWA)
W74-10871

NITRATES IN WATER SUPPLIES.
International Water Supply Association, London (England). International Standing Committee on Water Quality and Treatment.
Aqua, No 1, p 5-25, 1974. 6 tab, 67 ref.

Descriptors: *Reviews, *Public health, *Nitrogen, *Nitrates, *Water supply, Domestic wastes, Safety, Bacteria, Pathology, Disease, Pilot plants, Runoff, Industrial wastes.
Identifiers: Methemoglobinemia.

An international investigation was made to review the effects of raised nitrates in water supplies on health and water quality. Elevated nitrate concentration in the diet and large numbers of nitrate-reducing bacteria in the upper digestive tract are a primary cause of infantile methemoglobinemia. Susceptibility varies with external conditions, but a safety factor in public health should be taken into account. It was concluded that the recommended limit of 45-50 mg/liter should not be raised but should be further investigated. Water resources with more nitrate than 45-50 mg/liter could be made safe by diluting with water of lower nitrate content. Pilot plants have tested processes for removal of nitrate from sewage and water. Another alternative is to search for the origin of nitrogen in all forms from domestic sewage, as well as industrial wastes and runoff, and to control these sources. (Prague-FIRL)
W74-10886

UPTAKE OF CHLOROBIPHENYLS BY OYSTERS,
Woods Hole Oceanographic Institution, Mass.
V. Vreeland.
Environmental Pollution, Vol 6, No 2, p 135-140, February, 1974. 2 fig, 16 ref.

Descriptors: *Polychlorinated biphenyls, *Oysters, Chlorination, Sea water, *Absorption.
Identifiers: *Chlorobiphenyls uptake.

Accumulation of individual chlorinated biphenyls in small osyters (Crassostrea virginica) was proportional to the degree to chlorination of the isomer and to its concentration in seawater at environmental levels. Equilibrium was reached after one month, with concentration factors of 1200 to 48,000 for isomers with 2 to 6 chlorine atoms per molecule. Partitioning of PCB between more hydrophobic lipids and ambient seawater has been rejected as the uptake mechanism. (Sandoski-FIRL)
W74-10889

EFFECT OF PH ON SURVIVAL OF ESCHERICHIA COLI,
Central Public Health Engineering Research Inst., Nagpur (India).
For primary bibliographic entry see Field 5D.
W74-10890

RIVERS POLLUTION SURVEY IN SCOTLAND IN RETROSPECT AND PROSPECT,
Secretary of State for Scotland, Edinburgh. Scottish Development Dept.
For primary bibliographic entry see Field 5G.
W74-10896

5C. Effects Of Pollution

PREPARATION AND PROPERTIES OF QUINALDINE SULFATE, AN IMPROVED FISH ANESTHETIC,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
For primary bibliographic entry see Field 8I.
W74-10386

TOXICITY OF QUINALDINE SULFATE TO FISH,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
L. L. Marking, and V. K. Dawson.
Bureau of Sport Fisheries and Wildlife, Investigations in Fish Control, No 48, April 1973. 6 p, 6 tab, 16 ref.

Descriptors: *Fish management, *Fish control agents, *Fisheries, *Fish toxins, Fish physiology, Chemical reactions, Cold-water fish, Warm-water fish, Water quality, Water properties, Water temperature, Hydrogen ion concentration, Analytical techniques.
Identifiers: *Fish anesthesia, *Quinaldine sulfate, Fish handling.

The acute toxicities of the candidate fish anesthetic, quinaldine sulfate (QdS04), were determined against selected species of coldwater and warmwater fishes. The LC50's (concentrations producing 50% mortality) were derived for 3-, 6-, 24-, and 96-hr exposures in bioassays with different temperatures, hardnesses, and pH's. The 96-hr LC50's of QdS04 ranged from 6.8 mg/liter for largemouth bass to 72.5 mg/liter for carp. In very soft water QdS04 solutions are acidic and considerably less toxic than in harder water. This lack of activity is attributed to a decrease in the pH of the test solution which thereby decreases the concentration of the active, un-ionized form of the molecule. (Woodard-USGS)
W74-10387

THE EFFICACY OF QUINALDINE SULFATE AS AN ANESTHETIC FOR FRESHWATER FISH,
Bureau of Sport Fisheries and Wildlife, Washington, D.C.
For primary bibliographic entry see Field 8I.
W74-10388

RESIDUE OF QUINALDINE IN TEN SPECIES OF FISH FOLLOWING ANESTHESIA WITH QUINALDINE SULFATE,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
J. B. Sills, J. L. Allen, P. D. Harman, and C. W. Luhning.
Bureau of Sport Fisheries and Wildlife, Investigations in Fish Control, No 50, April 1973. 7 p, 1 fig, 8 tab, 7 ref.

Descriptors: *Fish management, *Fish control agents, *Fish physiology, *Toxicity, Fish toxins, Chemical reactions, Water properties, Warmwater fish, Salmonids, Cold-water fish, Water temperature.
Identifiers: *Fish anesthesia, *Quinaldine sulfate, Fish handling.

The concentration and persistence of residues of the anesthetic quinaldine in five species of both coldwater and warmwater fishes were measured following treatment with quinaldine sulfate. Quinaldine accumulated in relation to increasing temperature, treatment concentration, and length of exposure. Mean concentrations of quinaldine residues ranged from 1.18 to 8.31 microgram/g for the 0-hr withdrawal time. Initial residues were higher in warmwater species than in salmonids. Although a wide range of residue concentrations (0.80-9.34 micrograms/g) occurred immediately after exposure, these residues are dissipated rapidly when the fish are placed in fresh water. All fish tested after 24 hrs of withdrawal in fresh water contained 0.01 micrograms/g or less of quinaldine residue with the exception of the rainbow trout treated at 7C. (Woodard-USGS)
W74-10389

PHASE II: TEMPERATURE REQUIREMENTS OF SALMONIDS IN RELATION TO THEIR FEEDING, BIOENERGETICS, GROWTH AND BEHAVIOR,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
G. E. Davis.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 339 $3.25 in paper copy, $2.25 in microfiche. Oregon Water Resources Research Institute, Corvallis, Completion Report, June 30, 1974. 24 p, 8 fig, 3 tab, 3 ref. OWRR B-027-ORE(4).

Descriptors: Heated water, Thermal pollution, Water pollution effects, *Temperature, *Salmonids, *Stream fisheries, Ecosystems, Fish diets, *Chinook salmon, Fish reproduction, Growth rates, Rainbow trout.

Model stream ecosystems were used to evaluate the effect of a moderate increment of temperature change (4C) on the survival, growth and production of juvenile chinook salmon, Oncorhynchus tshawytscha, and on the abundance of the stream invertebrates. Growth rates were not greatly different between the heated and control stream but, because of higher survival rates, values of annual production were markedly greater in the control than in the heated stream. The abundance of food organisms, especially the mayflies and stoneflies, was greater and the number of kinds was greater in the control than in the heated stream. Laboratory studies defined relationships between rates of growth and food consumption for juvenile steelhead trout, Salmo gairdneri, kept as ambient and at elevated (3 and 6C) fluctuating temperatures during different seasons. Decelerating, curvilinear relationships were defined in most experiments. At low rates of food consumption temperature increase reduced growth rates. As consumption rate increased curves defined for control and elevated temperatures tended to converge. Food consumption rates of trout in a natural stream were estimated by comparing the fishes' growth rates with those of fish kept in the laboratory at known rations. Results suggested that if food availability remained unchanged, increase of temperature above normal seasonal temperatures would decrease growth rates of trout in their natural environment.
W74-10394

LIMNOLOGY OF LAKE MINNETONKA,
Minnesota Univ., Minneapolis. Limnological Research Center.
R. O. Megard.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 322, $5.50 in paper copy, $2.25 in microfiche. Dept. of Ecology and Behavioral Biology, March 1974. Interim Report No 11. 45 p, 12 fig, 9 tab, 18 ref. OWRR A-026-MINN(2).

Descriptors: *Phytoplankton, *Eutrophication, *Phosphorus, *Chlorophyll, *Minnesota, Lakes, Limnology, Water pollution effects, Morphometry, Sewage effluents, Nutrients.
Identifiers: *Lake Minnetonka(Minn), Organic carbon.

Fluctuations of population densities of phytoplankton in 4 basins of Lake Minnetonka in Minnesota were inferred from changes of concentrations of chlorophyll a and particulate organic carbon during the ice-free season. Concentrations of chlorophyll a during 1972 and 1973 were similar to those during 1968 and 1969 except in the lake's largest basin, where concentrations during 1972 and 1973 were only about 50% as high as during 1968 and 1969. The decrease of chlorophyll is attributable to the reduced influx of phosphorus, which decreased from about 13 metric tons/year because sewage effluents were diverted away from the basin during the winter of 1971-1972. The decrease of chlorophyll coincided with lower concentrations of total phosphorus. The average quantity of phosphorus in the Lower Lake decreased from 13 metric tons in 1968 and 1969 to 10 metric tons in 1973, and the average concentration of total phosphorus decreased from 62 mg m-3 to 47 mg m-3. The decrease between 1969 and 1973 is 42% of the decrease that will be required to reach the new steady state concentration of 26 mg m-3 that is expected to be achieved by 1977. The loss of phosphorus through the outlet of Lake Minnetonka is negligible. Most of the phosphorus lost from the water since 1971 must have been deposited in the sediments. The net rate of phosphorus sedimentation is almost 0.5 g m-2 yr-1. (Walton-Minnesota)
W74-10418

MECHANISMS THAT REGULATE GROWTH RATES OF PHYTOPLANKTON IN SHAGAWA LAKE, MINNESOTA,
Minnesota Univ., Minneapolis. Limnological Research Center.
R. O. Megard, and P. D. Smith.
Limnology and Oceanography. Vol 19, No 2, p 279-296, March 1974, 9 fig, 8 tab, 48 ref. OWRR A-016-MINN(6).

Descriptors: *Phytoplankton, *Eutrophication, *Photosynthesis, *Chlorophyll, *Minnesota, Growth rates, Regulation, Lakes, *Productivity, Water pollution effects.
Identifiers: *Shagawa Lake(Minn), *Aphanizonienon, Organic carbon.

Mean concentrations of chlorophyll a at six localities in Shagawa Lake in Minnesota ranged from 15 to 25 mg m-3 during June and July, increased to a maximum of 150 mg m-3 during a bloom of Aphanizonienon that occurred in August, and decreased rapidly in early September. Theoretical limits for integral photosynthesis and the total annual integral photosynthesis were calculated from estimates of attenuation coefficients for illumination, specific photosynthetic rates, and chlorophyll concentrations. Mechanisms responsible for the phytoplankton bloom are inferred from the changes of specific rates of production and specific rates of loss of particulate organic carbon in the mixed layer. Both rates decreased as the bloom developed, the latter decreasing faster than the former. The bloom ended when the specific loss rate suddenly increased. The specific production rate may have decreased during the bloom as nutrient utilization was inhibited by self-shading; bouyancy changes may have been primarily responsible for the changes of specific loss rates, acting as a critical mechanism of population regulation. The effects on phytoplankton populations of changing specific production and loss rates are demonstrated by comparing the integral photosynthetic rates and chlorophyll concentrations that would prevail under steady state conditions. (Walton-Minnesota)
W74-10422

THE FATE OF OIL SPILT AT SEA.
Central Dockyard Lab., Portsmouth (England).
For primary bibliographic entry see Field 5B.
W74-10434

DREDGING AND SPOILING ON LONG ISLAND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
J. S. O'Connor.
Technical Report No 19, November 1973. 34 p, 3 fig, 2 tab, 42 ref.

Descriptors: *Dredging, *New York, *Spoil banks, Landfills, Channel improvement, Land forming, Environment, Environmental effects, Water pollution effects.
Identifiers: Environmental impact(Dredging), Spoiling, *Long Island(NY).

Dredging and spoiling activity in the shore zone of Nassau and Suffolk Counties, New York, are summarized for the years 1961 through 1971. Statistics on dredge activity (volume dredged and area spoiled) are compiled and reviewed in terms of private and governmental actions, geographic distribution, and temporal trends. Most of the activity has been conducted at the margins of Great South and Peconic Bays, principally for maintenance dredging of navigation channels and development of the shore zone for residential and commercial purposes. A marked reduction in activity occurred in 1968. The environmental impacts of large-scale spoil actions are major and persistent. Spoil sites are typically developed rather quickly wherever population pressures and land values are high. The existing Permit System for dredging and spoiling is discussed. Recommendations for improving the planning and monitoring of activity are made in the context of environmental impact and existing regulations by various levels of government. (Knapp-USGS)
W74-10439

DRUG RESISTANT COLIFORMS CALL FOR REVIEW OF WATER QUALITY STANDARDS,
National Inst. for Water Research, Pretoria (South Africa).
For primary bibliographic entry see Field 5D.
W74-10497

2 RIVERS: VIRGINIA'S JAMES AND MARYLAND'S CHESTER.
Central Atlantic Environment Center, Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-10503

A TISSUE ENZYME ASSAY FOR CHLORINATED HYDROCARBON INSECTICIDES,
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
L. K. Cutkomp.
Copy available from GPO Sup Doc as EP1.23:660/2 73-027, $0.85; microfiche from NTIS, Springfield, Va 22161 as PB-234 404, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-73-027. May 1974. 39 p, 9 fig, 7 tab, 27 ref. EPA Project 16030 ELZ. R 801029.

Descriptors: *Chlorinated hydrocarbon pesticides, *Insecticides, *Enzymes, *Assay, *DDT, Water pollution effects, Lethal limit, Acoricides, Toxicity.
Identifiers: *Adenosine triphosphate phosphohydrolase(ATPase).

Certain chlorinated hydrocarbon insecticides, especially DDT and closely related chemicals, tested at low concentrations, adversely affect the ATPase enzyme system. DDT inhibited oligomycin-sensitive Mg2+ATPase (mitochondrial) both in vitro and in vivo. About 1 micromole gave 50% inhibition in fish brain and 0.5 ppb of DDT on water inhibited about 50% of mitochondrial Mg2+ATPase. Na+-K+APase was not inhibited in brain, but was inhibited in vivo in fish gills. Certain discriminating effects were found among chlorinated hydrocarbons, particularly with respect to inhibition of Mg2+ ATPase, but the ranking of compounds by enzymic effects does not always parallel toxicity values. Organophosphate and carbamate insecticides were ineffective. Further research is needed both in vitro and in vivo to determine how the adverse effects on the enzymes relate to practical interpretations of effects. The abnormally low ATPase activity in chronically treated fish is the first report of an adverse biochemical effect with sublethal doses of DDT. All effects appear to be primarily within the group of insecticides and acricides which are persistent in parts of the environment and in organisms. (EPA)
W74-10526

THE EFFECTS OF VARIATIONS IN TURBIDITY ON CYCLES OF PLANKTONIC AND BENTHIC ORGANISMS IN FLOOD CONTROL RESERVOIRS OF NORTHERN MISSISSIPPI,
Mississippi Univ., University. Dept. of Biology.
Y. J. McGaha, and J. P. Steen.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 437, $3.25 in paper copy, $2.25 in microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report, July 1974. 29 p, 2 fig, 2 tab, 19 ref. OWRR A-072-MISS(1).

Descriptors: *Benthic fauna, *Diatoms, *Cyanophyta, *Chlorophyta, Algae, *Turbidity, Productivity, *Mississippi, Flood control, Reservoirs, Reservoir operation, Plankton, Physicochemical properties, Benthos, Water pollution effects, *Anabaena.
Identifiers: *Melosira sp.

Plankton populations, turbidity and other physicochemical parameters were sampled in four flood control reservoirs of northern Mississippi. Numbers of organisms were compared with turbidity and other concomitant variables. Each plankter responded to environmental changes in an individual manner. A factor which led to decrease in population of one plankter may enhance that of another. High turbidity was deleterious to green and blue-green algae and led to drastic reductions in their numbers. High silica content associated with high turbidity led to substantial increases in diatoms. In the presence of high silica content the diatom Melosira sp. showed large populations at all depths in spite of the high turbidity. Anabaena sp. and other blue-green algae and many green algae decreased drastically as turbidity increased above 25 ppm, but as turbidity decreased their population increase was directly correlated with phosphate content. Benthic fauna appeared to be more closely related to bottom type, submerged vegetation and normal life cycles than to turbidity.
W74-10532

MACROBENTHOS AS INDICATORS OF ECOLOGICAL CHANGE,
Lamar Univ., Beaumont, Tex. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W74-10534

SURVIVAL OF ESCHERICHIA COLI IN OLIGOTROPHIC WATERS,
Washington State Univ., Pullman. Dept. of Civil and Environmental Engineering.
D. L. Johnstone.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 461, $3.75 in paper copy, $2.25 in microfiche. Completion Report, June 30, 1974. 66 p, 17 fig, 3 tab, 44 ref. OWRR A-063-WASH(1). 14-31-0001-4048.

Descriptors: *Oligotrophy, Coliforms, *Periphyton, Protozoa, Bacteria, *Escherichia Coli, Microorganisms, Water pollution effects, *Washington.
Identifiers: *Colpidium sp, *Cytophaga sp, *Psychrophilic bacteria.

The effects of the indigenous microflora and microfauna of oligotrophic high-mountain waters upon the survival of fecal coliforms have been studied. Surface water and periphytic (aufwuchs) populations were examined for their anticoliform activity at 0, 5.5, and 11C. The most pronounced coliform die-off occurred at 11C. At this temperature, the indigenous bacterial and protozoan populations increased in density most readily. Periphytic populations were more effective in coliform eradication than surface water populations at all tested temperatures. In both surface water and periphytic samples, a peritrichously flagellated protozoan, tentatively identified as Colpidium sp., was observed actively feeding on the coliform populations following repeated exposure of coliforms to the indigenous microorganisms. Several genera of psychrophilic bacteria were isolated from these water. Of these, 13 isolates of Cytophaga sp. have been shown to be facultative psychrophiles.
W74-10535

NTA AND MERCURY IN ARTIFICIAL STREAM SYSTEMS,
Georgia Univ., Athens. Inst. of Ecology.
For primary bibliographic entry see Field 5B.
W74-10538

WATER QUALITY CRITERIA DATA BOOK - VOL. 5 - EFFECTS OF CHEMICALS ON AQUATIC LIFE,
Battelle Columbus Lab., Ohio.
H. T. Kemp, R. L. Little, V. L. Holoman, and R. L. Darby.
Copy Available from GPO Sup Doc as EP1.16:18050 HLA 09/73, $4.95; microfiche from NTIS, Springfield, Va 22161 as PB-234 435, $2.25. Environmental Protection Agency, Water Pollution Control Research Series, Report 18050HLA09/73, September 1973. 537 p. Grant No. R-800942. EPA Project 18050 HLA.

Descriptors: *Toxicity, *Water pollution effects, Industrial wastes, Pesticides, Aquatic plants, Aquatic animals, Absorption, *Reviews, Marine fish, Freshwater fish, Chlorinated hydrocarbon pesticides, Carbamate pesticides, Phosphothicate pesticides, Organic acids, Antibiotics(Pesticides), Heavy metals, Metals, Inorganic pesticides, Biochemical oxygen demand, Thiocarbamate pesticides, Triazine pesticides, Organophosphorus pesticides, Polychlorinated biphenyls, Surfactants, Nutrients, Urea pesticides, Organic compounds, Organic pesticides, Zooplankton, Phytoplankton, Aquatic algae, Marine algae, Water birds, Chlorophyta, Pyrrophyta, Cyanophyta, Chrysophyta, Crustaceans, Mollusks, Annelids, Aquatic insects, Benthic fauna, Protozoa, Invertebrates, Diatoms, Euglenophyta, Frogs, Marine animals, Newts, Toxins, Phenolic pesticides, Dyes, Chemical, *Data collections, *Water quality standards, *Pollutant identification.
Identifiers: Anesthetics, Oil dispersants, Echinoderms, Macroinvertebrates, *Water quality data.

This report is an extensive compilation of data on the effects of chemicals on aquatic life which were extracted from literature published during the period 1968-1972. It is an update of an earlier report entitled 'Water Quality Criteria Data Book, Volume III, Effects of Chemicals on Aquatic Life' (Kemp, et al., 1971). The data are arranged alphabetically by chemical and are concisely represented in a columnar format which includes organism names, type of study, chemical effect, controlled parameters, significant comments on the test, and source of the data. The data were compiled using a program prepared as part of the work. (See also W72-08157, W72-08158, W73-01976 and W73-03503) (EPA)
W74-10541

A REVIEW OF THE PHYSIOLOGICAL IMPACT OF MERCURIALS,
Savannah River Ecology Lab., Aiken, S.C.
M. C. Ferens.
Copy Available from GPO Sup Doc as EP1.23:660/3-73-022, $1.00; microfiche from NTIS, Springfield, Va 22161 as PB-234 644, $2.25. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-73-022 February 1974. 54 p, 138 ref. EPA Program Element IBA023. Project R800510.

Descriptors: *Heavy metals, Plant growth, *Animal metabolism, Mode of Action, Toxicity, *Biochemistry, Cytological studies, *Mercury, Plant physiology, Animal physiology, Enzymes, *Reviews, Photosynthesis.
Identifiers: *Mercury compounds, *Mercurials, Methyl mercury, Dimethyl mercury, Phenyl mercury, Methoxyethyl mercury, Ethyl mercury, Mercuric salts, Metallic mercury, Kreb's cycle enzymes, Kidney damage, Neurological damage.

Literature on the biological effects of mercurials was reviewed with the purpose of understanding impact on individual organisms in terms of biochemical or cellular damage. Mercurialism is manifested primarily in kidney or brain damage in animals and in growth reduction in plants. Exposure to inorganic mercury compounds usually results in kidney damage while alkyl mercurialism is characterized by brain damage; however, some degree of both kidney and neurological injury results from exposure to either category of mercurials. Kidney injury is due apparently to damage of Kreb's cycle enzymes, thus reducing available energy to actively resorbtions. Impaired protein synthesis as well as reduction in activity of Kreb's cycle enzymes may be important in brain damage resulting from mercury poisoning. Photosynthetic damage is apparently the biochemical bases of mercurial effects observed in plants. (EPA)
W74-10548

FORGING THE MISSING LINK,
L. F. Webster.
Water and Pollution Control, Vol 112, No 3, p 42-45, March 1974. 3 ref.

Descriptors: *Food chains, *Nutrients, Wastes, *Ecosystems, Shellfish, Nitrogen, Phosphorus, Sewage, Effluents, Algae, Sea water, Mollusks, Organic wastes, Domestic wastes, Aquiculture, Tertiary treatment, *Waste water treatment, *Recycling.

A study aimed at using high nutrient wastes as an integral part of a contrived food chain sequence is described. John Ryther of the Woods Hole Oceanographic Institution is working on a project which anticipates the controlled feeding of raw domestic sewage to a marine environment. This would promote the growth of specific types of algae that would be eaten by shellfish. The wastes of these shellfish then serve as food for sea worms that are, in turn, consumed by succeeding orders of fish higher in the food chain which, in turn, form part of a human diet. Undesirable elements would be trapped, or removed from the system elsewhere--viruses through containment in the shellfish; ammonia and phosphate via growth of other selected algae and seaweeds. This would establish a complex, multi-species food chain which would serve the dual function of a tertiary sewage treatment process and an aquiculture system producing a primary crop of shellfish and secondary crops of other potentially valuable marine organisms. (Merritt-FIRL)
W74-10558

NO RADIOACTIVE FISH IN LAKE MICHIGAN.
Industrial Research, Vol 16, No 3, p 22, 25, March 1974.

Descriptors: *Radioactivity, *Lake Michigan, Radioisotopes, Fish, Investigations, Computers, Water pollution sources, Water pollution effects.

The results of a study on radioactivity in Lake Michigan are discussed. Although environmentalists continue to push for greater precautions for nuclear reactors, a study issued by Environmental Research Group, Inc. reports that, even if the worst leakage allowed by the AEC were to occur from power plants around Lake Michigan, radioactivity in the lake's fish would not build up to a point higher than half the permissible level. Radioactivity from most isotopes in edible fish caught in the immediate vicinity of a nuclear power plant discharge would be practically none by the time the fish was consumed. In the case of iodine, for example, the highest level reached would be 5.5% of their permissible level. Moreover, the radioactivity would eventually be removed from the lake waters through burial in sediment or removal in food products. (Merritt-FIRL)
W74-10561

EFFECTS OF COPPER, ZINC, AND CADMIUM ON SELANASTRUM CAPRICORNUTUM,
Idaho Univ., Moscow. Dept. of Biological Sciences.
L. Bartlett, F. W. Rabe, and W. H. Funk.
Water Research, Vol 8, p 179-185, March 1974. 8 fig, 3 tab, 12 ref.

Descriptors: *Chlorophyta, *Copper, *Zinc, *Cadmium, *Toxicity, Algicides, Growth rates, Analysis, Algae, *Bioassay, *Utah, Water pollution effects.
Identifiers: *Selanastrum capricornutum, *Coeur d'Arlene River(Utah).

The algicidal and algistatic effects of copper, zinc, and cadmium on Selanastrum capricornutum, unicellular green algae were analyzed by using a modification of the Algal Assay Procedures Bottle Test. Algicidal concentrations of copper, zinc, and cadmium were 0.30, 0.70, and 0.65 mg/l. Treatment of Selanastrum with various concentrations of the metals resulted in similar growth rates characterized by extended lag growth phases. Combinations of the metals were similar in toxicity to equal concentrations of zinc. Combinations of copper and cadmium resulted in a greater growth rate than equal concentrations of copper suggesting that cadmium inhibits copper toxicity. Selanastrum was able to exist in waters from the upper South Fork and North Fork of the Coeur d'Alene River where zinc and other metals were in low concentration. However, the algae were not able to tolerate zinc concentrations greater than 0.5 mg/l from waters of other parts of the drainage. These observations were consistent with laboratory findings where 0.7 mg/l zinc was algicidal and 0.1 mg/l inhibited the growth of Selanastrum. (Merritt-FIRL)
W74-10563

A MATHEMATICAL MODEL OF A RIVER PURIFICATION LAKE,
Severn River Authority (England).
B. T. Chapman.
Water Treatment and Examination, Vol 22, No 4, p 269-291, 1973. 18 fig, 14 ref.

Descriptors: *Mathematical models, *Retention, *Water quality, *Effluents, *Lakes, Organic matter, Influents, *Chlorophyll, Algae, Dissolved oxygen, Treatment facilities, Sedimentation, Computers, Water pollution effects.

A mathematical model was developed of a river purification lake to predict the effect of various retention times on the quality of the lake effluent. The results showed that doubling the experimental retention time to 9.6 days would not remove the smallest particles, but halving the retention time to 2.4 days produced a deterioration in the effluent quality. The removal of soluble organic carbon within the lake was 21% of the influent concentration at 9.6 days retention and 6% at 2.4 days retention. The model predicted that, with a retention time of 9.6 days, by the middle of May the chlorophyll-a concentration in the lake would exceed 100 mg/cu m and would continue to increase throughout the summer. If this happened, the water would become extremely dark green with a skin of algae present on the surface. A retention period of only 2.4 days meant that the predicted chlorophyll-a concentration was only slightly greater than the concentration of the influent, showing the production was taking place only to a small extent. The maximum predicted chlorophyll-a concentration was 21 mg/cu m. The dissolved oxygen concentration was not predicted to fall below 3 mg/liter under any retention time. (Merritt-FIRL)
W74-10571

A STUDY OF DIISOPROPYLGUANIDINE AND DIISOPROPYLGUANIDINE HYDROCHLORIDE TO DETERMINE THEIR HYGIENIC LEVELS IN WATER BODIES, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Epidemiologii i Mikrobiologii, Lvov (USSR).
P. I. Fenyuk.
Gig Sanit. Vol 37, No 7, p 105-106, 1972.
Identifiers: *Guanidines, Hydrochlorides, Hygienic properties, *Organic compounds, Rodents, *Lethal limit, Water pollution effects.

Hygienic properties and effects were studied for determining maximum allowable water concentrations (MAWC). The LD50 values determined for albino rats and mice are 2.88 and 1.34 g/kg, respectively. A cumulation factor of 1.8 was found. MAWC of 1 mg/l is recommended.--Copyright 1973, Biological Abstracts, Inc.
W74-10598

IMPACT OF URBANIZATION ON QUALITY OF RIVER WATER (VLIYANIYE URBANIZATSII NA KACHESTVO RECHNYKH VOD),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 5B.
W74-10632

ADSORPTION OF PHOSPHORUS BY LAKE SEDIMENT,
New Hampshire Univ., Durham.
R. D. Harter.
Soil Science Society of America Proceedings, Vol 32, No 4, p 514-518, July-August 1968. 5 fig, 1 tab, 12 ref.

Descriptors: *Bottom sediments, *Lakes, *Adsorption, *Phosphorus, Eutrophication, Nutrients, Algae, Phosphates, Path of pollutants, Limnology.

The sediments of eutrophic lakes are capable of adsorbing large amounts of phosphorus from the water. To study the sorption mechanism, between 0 and 2.2 mg P was added to 0.1 g sediment samples (1:50 sediment-solution ratio). After equilibrium was established, P remaining in solution was determined, and adsorbed P was extracted with 0.5N NH4F and 0.1N NaOH. Whereas all P adsorbed into the NaOH-extractable fraction appeared to occur as an iron phosphate, NH4F apparently extracted P bonded by two different mechanisms. When less than about 0.1 mg P was added, NH4F extracted a tightly bonded form of P, probably occurring as an aluminum phosphate. When more than 0.1 mg P was added, additional P in a more loosely bonded form was adsorbed into the NH4F-extractable fraction. The loosely bonded P appeared to be independent of Al content of the sediment and could be removed by successive water extraction. The capability of the sediment to adsorb considerable loosely bonded P means that large influxes of P into the lake may be held temporarily and subsequently released to growing plants and algae. (Knapp-USGS)
W74-10642

A PRELIMINARY ASSESSMENT OF THE ENVIRONMENTAL VULNERABILITY OF MACHIAS BAY, MAINE TO OIL SUPERTANKERS,
Massachusetts Inst. of Tech., Cambridge.
S. F. Moore, R. L. Dwyer, and A. M. Katz.
Available from NTIS, Springfield, Va 22161 as COM-73-10564 Price $3.00 printed copy; $2.25 microfiche. Massachusetts Institute of Technology Sea Grant Project Report MITSG 76-6, January 15, 1973. 162 p, 21 fig, 17 tab, 136 ref. NOAA Sea Grant 2-35150.

Descriptors: *Oil spills, *Maine, *Water pollution effects, Oil industry, Coasts, Beaches, Reviews, Ecology, Environment, Water pollution sources.
Identifiers: *Environmental vulnerability, *Machias Bay(Maine).

The environmental vulnerability of Machias Bay, Maine, to a proposed oil supertanker terminal was surveyed by review and interpretation of the existing literature on the subject. A framework is proposed for assessing impacts of environmental changes. Processes considered are transport and dispersion, biological transfers and modifications, and biological effects. Separate consideration is given to a description of existing conditions along the eastern coast of Maine, the composition and characteristics of crude petroleum and petroleum products, the effects of oil on marine organisms, and potential spill trajectories and behavior. There is a relatively high probability (10%-50%) that 10-20 miles of shoreline would be covered by a major oil spill. The results depend upon spill size, point of release, season of the year, and offshore currents. Machias Bay is highly vulnerable environmentally to oil supertankers. The release of a major catastrophic spill (30,000 tons) is expected to occur as frequently as once in 20 years and a moderate spill (500 tons) once every year. The biological effects of these are likely to be very extensive with some localized permanent changes in communities. (Knapp-USGS)
W74-10656

THE SIZE OF DIATOMS. V. THE EFFECT OF ANIMAL GRAZING,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Lab.
R. S. Wimpenny.
Journal of Marine Biological Association of the U.K., Vol 53, No 4, p 957-974, 1973. 10 fig, 6 tab, 8 ref.

Descriptors: *Size, *Diatoms, *Grazing, Marine algae, Oceans.
Identifiers: *Artemia salina, *Skeletonema costatum, *Tigriopus, *Ditylum brightwellii.

Eight series of experiments were conducted to determine any effect on centric diatom cell diameter that might be attributed to animal grazing on these populations. Artemia salina grazing on Skeletonema costatum, Tigriopus sp. on S. costatum and Artemia on Ditylum brightwellii were used. Fifty measurements of the cell diameters (transapical axes) were taken from each of the grazed and control samples which made up the series. Visual inspection of frequency distribution of diameters suggested that cells of grazed populations were larger than control. To test whether Artemia made any selection by size when feeding on non-growing objects this animal was kept in a dispersion of mulberry pollen. The medium used for the cultures was local sea water prepared and enriched by sodium nitrate, disodium hydrogen phosphate and soil solution. Before being introduced into the unialgal diatom cultures the chosen animals were cleansed and starved to avoid contamination by flagellates and protozoa. The results show that cells of grazed populations were larger than those of the ungrazed populations. (Jones-Wisconsin)
W74-10762

PROCEEDINGS OF MEETING ON ENVIRONMENTAL POLLUTION (3RD) HELD AT FORT MCNAIR ON 17-18 MAY 1972, SPONSORED BY AMERICAN ORDNANCE ASSOCIATION.
Edgewood Arsenal, Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 5G.
W74-10765

OUR GREAT LAKES,
Wisconsin Univ., Madison. Sea Grant College Program.
L. Weimer, W. Downs, J. Napoli, P. Mallonee, and P. Smith.
Available from the National Technical Information Service, Springfield, Va, 22161 as COM-73-11686, $3.50 in paper copy, $2.25 in microfiche. Report WIS-SG-73-114, September 1973. 48 p, 3 fig.

Descriptors: *Great Lakes, *Eutrophication, *Water pollution, Water policy, Recreation, Water supply, Beach erosion, Fisheries, Transportation, History, Management, Inland waterways, Lake Erie, Lake Huron, Lake Michigan, Lake Ontario, Lake Superior, Institutions.

The importance of the Great Lakes to the United States and Canada is examined. In 1972, over 200 million tons traveled the lakes with 53 million tons valued at 5 billion dollars, through the St. Lawrence Seaway. Iron ore, limestone, coal and grain represent the major commodities shipped. Increased railroad competition, the winter shut down and technical changes in requisite port facilities are identified as major challenges to the lakes' future shipping potential. Their recreational importance is also considered. Recreational uses face overcrowding, declining water quality and competing municipal and industrial water uses. Pollution poses an important danger to the lakes' future. These problems are examined for each lake in the chain. While Lake Erie represents the most polluted lake, it still supports the largest perch fishery within the Great Lakes. Erosion also threatens the lakes. One third of the U.S. lake side is subject to significant erosion and it is being accelerated by growing land use adjacent to the lakes. The myriad of local, state, federal, and international agencies controlling the quality of the Great Lakes are identified. Their potential roles in meeting the future changes are suggested. (Schroeder-Wisconsin)
W74-10784

EFFECTS OF ACUTE COLD SHOCK ON THE CHANNEL CATFISH, ICTALURUS PUNCTATUS,
Battelle-Pacific Northwest Labs., Richland, Wash.
R. M. Block.
Available from the National Technical Information Service, Springfield, Va 22161 as BNWL SA-4709, $3.00 in paper copy, $2.25 in microfiche. Report BNWL SA-4709 (1972). 15 p, 5 fig, 14 ref.

Descriptors: *Channel catfish, Water temperature, Cryogenics, Fish, Animal physiology, Cooling water, Powerplants, Mortality, *Thermal pollution.
Identifiers: *Acute cold shock, Osmoregulatory response.

Elevated temperatures near cooling water outfalls may bring water temperatures closer to the optimum or preferred temperature of certain fish species perhaps attracting fish which would then become 'trapped' in the cooling water discharge canals or mixing zones by metabolic acclimation to these higher temperature levels. Sharp temperature decreases may result when artificial heating water suddenly ceases, producing large fish kills. Changes in temperature, either acute or chronic, will affect the osmoregulatory response of fish. Specific physiological and biochemical changes in the blood may provide a sensitive method for predicting the effects on fish of sudden temperature variation in ambient water. Method for obtaining blood from fish and the actual measurement of osmolarity and chloride are quite simple. Response of channel catfish to cold shock is indicated by osmoregulatory collapse. Data denote a gradual decrease of plasma osmolarity and chloride during the period when catfish are exposed to cold stress. The disruption of the phase distribution in these fish is reversible up to a point in time but not completely reversible when temperature is again elevated to 30C. It takes channel catfish approximately four days to recover from cold shock stress. (Jones-Wisconsin)
W74-10785

BACTERIOLOGICAL SURVEYS, CHARLOTTE COUNTY, NEW BRUNSWICK, SHELLFISH AREA N.B. 13, 1973,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
C. R. Blaise, and R. Legault.
Report No EPS 5-WP-73-2, December 1973. 61 p, 3 fig, 31 tab, 16 ref.

Descriptors: *Bacteria, *Surveys, Commercial shellfish, Clams, Coliforms, *Canada, Water pol-

ution sources, Fish harvest, Regulation, Water ollution effects, Fisheries.
dentifiers: *Charlotte County(New Brunswick), Bay of Fundy(Canada).

Bacteriological surveys of Shellfish Area 13, ocated on the Bay of Fundy, encompassing horeline waters from Red Head in the east to L'Etang Head in the west, were conducted. Reassessment was made of the current classification of hese areas as either 'open' or 'closed' for shellfish harvesting for consumption in the raw state, and to letermine whether shellfish from 'closed' areas ould be exploited provided they underwent an approved purification process. Total of 575 sea water amples from 100 locations, 89 stream samples rom 11 locations, 7 sewage samples from two loations and 45 clam (Mya arenaria) specimens rom 9 locations were collected and analyzed for oliform and fecal coliform numbers. Results indicated the need for closure of Penn Harbour, ithin Red Head to Seely Head area, due to unreated domestic sewage inflows. Shellfish from his sector cannot even be harvested for purificaion purposes. Increased contamination by fish lant and domestic wastes warrant extension of he closure in Beaver Harbour even for purificaion purposes. A second closure was necessary in he Woodland-Buckman area. Water of poor bacteriological quality warranted closure of a major ection within Deadman Harbour and Black's Harour. (Jones-Wisconsin)
W74-10786

BACTERIOLOGICAL SURVEYS, CHARLOTTE COUNTY, NEW BRUNSWICK, SHELLFISH AREA N.B. 14, 1973,
Environmental Protection Service, Ottawa Ontario). Water pollution Control Directorate.
C. R. Blaise, and R. Legault.
Report No EPS 5-WP-73-3, December 1973. 55 p, fig, 30 tab, 12 ref.

Descriptors: *Bacteria, *Surveys, *Commercial hellfish, *Canada, Clams, Coliforms, Water polution sources, Sea water, Fish harvest, Regulaion, Water pollution effects, Fisheries.
dentifiers: *Charlotte County(New Brunswick), Bay of Fundy(Canada).

Bacteriological surveys of New Brunswick Shellfsh Area 14, including L'Etang River and Harbour, Sturgeon and Little Sturgeon Cove, and the Back Bay area, were conducted to reassess the current lassification of either 'open' or 'closed' for shellfsh harvesting for consumption in the raw state, nd to determine whether shellfish from 'closed' reas could be exploited provided they underwent n approved purification process. Total of 993 sea vater samples from 46 locations, 58 stream samles from 8 locations, and 55 clam (Mya arenaria) pecimens from 11 locations were collected and nalyzed for coliform and fecal coliform numbers. Results showed that the L'Etang River is subject o gross contamination from a paper company. In L'Etang Harbour, untreated sanitary wastes from hospital and the town pollute Sturgeon Cove vaters. Clams from this area could be harvested or purification purposes. Bacteriological water uality west of Park and Goat Islands and in the outhern section of L'Etang Harbour met shellfsh-growing standards. Maintenance of the resently enforced closure at Back Bay was necesary due to sewage and fish plant waste inflows. ll other sectors, including Stump Cove, Bull lead Cove, St. Martin Bay, and the coves within he Back Bay area, had waters of excellent bacteriological quality. (Jones-Wisconsin)
W74-10787

BACTERIOLOGICAL SURVEYS, CHARLOTTE COUNTY, NEW BRUNSWICK, SHELLFISH AREAS N.B. 9, 10, 11, AND 12, 1973,
Environmental Protection Service, Ottawa Ontario). Water Pollution Control Directorate.
C. R. Blaise, and R. Legault.
Report No EPS 5-WP-73-1, December 1973. 58 p, 3 fig, 26 tab, 12 ref.

Descriptors: *Bacteria, *Surveys, Commercial shellfish, Clams, Coliforms, *Canada, Sea water, Water pollution sources, Fish harvest, Regulation, Water pollution effects, Fisheries.
Identifiers: *Charlotte County(New Brunswick), Bay of Fundy(Canada).

Bacteriological surveys of shellfish growing areas and adjacent waters were conducted in Charlotte County, New Brunswick during June-September 1973. A total of 596 sea water samples from 95 locations, 134 stream samples from 16 locations, and 50 clam (Mya arenaria) specimens from 10 locations were collected and analyzed for coliform and fecal coliform numbers. Results indicated the definite need for closures in parts of Little Lepreau Basin and Lepreau Harbour, and for abatement of domestic pollution from homes along the shoreline. Clams from these sectors, however, could be exploited after purification. The current New River Harbour closure should be maintained because of domestic sewage input from homes near the mouth of New River and because of the provincial park septic tank effluent input, particularly during heavy runoff periods. Other sectors of Area N.B. 11 were of exceptionally good bacteriological quality. The shellfish closure in Pocologan Harbour should be retained on a summer basis only; rescinding this closure from October 1 to May 31 is recommended because all known potential sources of fecal pollution are inoperative during that period. Bacteriological water quality in all other sectors of Pocologan Harbour are satisfactory. (Jones-Wisconsin)
W74-10788

SURFACE RUNOFF LOSSES OF SOLUBLE NITROGEN AND PHOSPHORUS UNDER TWO SYSTEMS OF SOIL MANAGEMENT,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-10789

METABOLIC CYCLES FOR TOXIC ELEMENTS IN AQUEOUS SYSTEMS,
Minnesota Univ., St. Paul. Freshwater Biological Research Foundation.
J. M. Wood.
Revue Internationale d'Oceanographie Medicale, Vol 31-32, p 7-16, 1973. 2 fig,1 tab, 17 ref.

Descriptors: *Toxins, *Inorganic compounds, *Biodegradation, *Aquatic environment, Chemical degradation, Oxidation, Chemical properties, Heavy metals, Mercury, Oxidation reduction potential, Arsenic compounds.
Identifiers: *Toxic elements, Biochemical cycles, Biosynthesis, Detoxification.

Metabolic cycles for elements regarded as toxic to higher organisms are reviewed and those parameters important in regulating these cycles are discussed. Those elements classified as very toxic and relatively accessible represent potential public health hazards. When inorganic compounds are introduced into biological systems, it should be recognized that enzyme systems have evolved which are capable of changing the oxidation states of such compounds. Bioaccumulation of reactive inorganic species depends largely upon the transport mechanisms from the intestine into the blood stream, and in the case of the potent neurotoxins, partition into the lipid regions. Three coenzymes are known to be involved in the methyl transfer reactions in biological systems: S-adenosylmethionine, N5-methyltetrahydrofolate derivatives, and methylcorrinoid derivatives. With the periodic table and knowledge of the properties of the toxic elements, prediction can be made of how most of these should behave. The mercury and arsenic cycles are detailed. Using the same approach, it can be predicted that tin, platinum, palladium, gold, and thallium will be methylated in the environment, but lead, cadmium, or zinc will not be methylated. (Jones-Wisconsin)
W74-10791

EXPERIMENTAL INVESTIGATIONS, AT LABORATORY (SIC), ON THE TRANSFER OF MERCURY OF MARINE TROPHIC CHAINS,
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
F. Laumond.
Revue Internationale d'Oceanographie Medicale, Vol 31-32, p 47-53, 1973. 3 tab, 3 ref.

Descriptors: *Mercury, *Transfer, *Oceans, *Food chains, Phytoplankton, Zooplankton, Fish, Mollusks, Mussels, Toxicity, Copper, Zinc, Chromium, Lead, Laboratory tests.
Identifiers: Alkylation mechanisms, Pelagic food chain, Neritic food chain.

A method to study heavy metal toxicities evaluates a pelagic food chain including sea water - plankton Asterionella japonica and Diogenes sp. (phytoplankton) + Artemia salina (zooplankton - Cyprinidae (fish)) and neritic food chain with molluscs including sea water - phytoplankton (Diogenes sp.) - molluscs (mussels). The first trophic level (plankton) is contaminated with sea water polluted by addition of traces of mercuric chloride alone or associated with various organic compounds. The second trophic level, represented by fish or mollusc, is, as in natural conditions, contaminated at the same time by the water and by the food, that is, the first trophic level collected after its contamination by the water. For determination of mercury a titrimetric method with extraction by diphenyl-thio-carbazone or dithizone was usually employed using the neutron-activation method as a reference. Addition of 0.015 ppm of mercury to the water of the pelagic chain multiplies by 20 to 100 times the amount of mercury in plankton and by 20 to 40 times that in fish. An addition of 0.1 ppm of mercury to the water of the neritic chain with molluscs multiplies by 1000+ the amount of mercury in phytoplankton, and by 200 to 400 times that in mussels. (Jones-Wisconsin)
W74-10792

MARINE POLLUTION BY METALS AND THEIR ACCUMULATION BY BIOLOGICAL INDICATORS (ACCUMULATION FACTOR),
Trieste Univ. (Italy). Inst. of Hygiene.
L. Majori, and F. Petronio.
Revue Internationale d'Oceanographie Medicale, Vol 31-32, p 55-90, 1973. 52 fig, 11 tab, 10 ref.

Descriptors: *Oceans, *Pollutants, *Heavy metals, *Bioindicators, Mathematical models, Toxicity, Food chains, Cadmium, Copper, Lead, Mercury, *Mussels, Lethal limit.
Identifiers: *Accumulation factor.

Proliferation of potentially toxic metals in the marine environment and their accumulation by aquatic organisms to the point of endangering their survival and through food chains, with unpredictable consequences to man, is analyzed. Mussels, Mytilus galloprovincealis, proved sensitive indicators of metal pollution in laboratory tests and were the basis of a mathematical model of correlation between pollution and bioaccumulation. Results of the accumulation by mussels of cadmium, copper, lead, and mercury in the form of bivalent soluble ions in 5-500 ppb concentrations indicate that when a certain minimum pollution threshold is exceeded, the initial accumulation rate is proportional to the added pollutant and decreases in time to zero. An apparent accumulation equilibrium is reached which grows linearly and sometimes proportionally with the pollution level. The accumulation stage phenomena suggests an accumulation factor (AF) which is more representative of pollution than the concentration factor and is more useful for quantifying the affinity of metals to biological tissue in the following order: cadmium < lead < copper < mercury according to the elec-

tronegativity and the energetics of the chemical bond. The utility of AF depends on using mussels as fast and sensitive indicators of marine pollution for sufficiently low values of concentration and duration. (Auen-Wisconsin)
W74-10793

A COMPARISON OF THE PHOTOSYNTHESIS-LIGHT INTENSITY RELATIONSHIP IN PHYLOGENETICALLY DIFFERENT MARINE MICROALGAE,
Skidaway Inst. of Oceanography, Savannah, Ga.
W. M. Dunstan.
Journal of Experimental Marine Biology and Ecology, Vol 13, No 3, p 181-187, 1973. 3 fig, 16 ref.

Descriptors: *Photosynthesis, *Light intensity, *Marine algae, Phylogeny, Chlorophyll, Phytoplankton, Metabolism, Diurnal, Diatoms, Dinoflagellates, Chlorophyta, Chlorella, Scenedesmus.
Identifiers: *Coccolithophores, Amphidinium carteri, Cyclotella nana, Thallasiosira pseudonana, Isochrysis galbana.

Whether there are differences in one basic physiological characteristic of marine microalgae, namely, the photosynthesis-light intensity relationship was determined. Measured under equivalent physiological conditions, the photosynthesis-light intensity relationship based on oxygen production/mg chlorophyll a was found to be the same in five species representing the different chlorophyll c containing divisions of marine phytoplankton. Other non-photochemical metabolic processes related to photosynthesis such as diurnal variations, maximal photosynthesis rates, and dark oxygen uptake were quite different, and so these are the more significant factors in production and ecological distribution of diatoms, dinoflagellates, and coccolithophores. In contrast, the green algae tested showed a significantly different photosynthesis-light intensity curve from the chlorophyll c group. Based on the representative organisms tested there is no basic difference between diatoms, dinoflagellates, and cocclithophores in the photosynthesis process. The characteristics which are variable and can be associated with a particular species, phylogenetic group, or ecological race are those related to non-photosynthetic metabolic processes and non-photochemical reactions associated with, or reflected in, growth rates and photosynthesis saturation rates. These are the significant determining factors in production and ecological distribution. (Jones-Wisconsin)
W74-10795

ELIMINATION OF PHOSPHATE DETERGENTS AND PSYCHOLOGICAL REACTANCE,
Florida Univ., Gainesville. Dept. of Marketing.
M. B. Mazis, R. B. Settle, and D. C. Leslie.
Journal of Marketing Research, Vol 10, No 4, p 390-395, 1973. 6 tab, 14 ref.

Descriptors: *Phosphates, *Detergents, *Psychological aspects, *Florida, Attitudes, Marketing, Legislation.
Identifiers: *Psychological reactance theory, Miami(Fla), Tampa(Fla), No-phosphate detergents.

Consumers' reaction to elimination of phosphate laundry detergents was studied to determine if their attitudes toward laundry detergents and antiphosphate laws can be predicted by the psychological reactance theory as formulated by Brehm, to explain why many people respond negatively to any force which restricts their freedom of action. Two hypotheses were formulated about Miami consumers based on psychological reactance theory predictions: Miami consumers, who were prohibited by law from purchasing products containing phosphates, will express more positive attitudes toward laws prohibiting the sale of phosphate detergents. A comprehensive questionnaire was designed to determine consumers' attitudes about laundry detergents and related products, their opinions about laws regulating the use of phosphates, and their demographic characteristics. Miami and Tampa, Florida homogeneous population samples were interviewed simultaneously. Questioning revealed that all Miami consumers were aware that they were using a non-phosphate product. Differential attitudes expressed by product switchers and non-switchers can be attributed to reactance effects rather than to physical differences among the products used. (Jones-Wisconsin)
W74-10798

SOME CHARACTERISTIC FEATURES OF THE BACTERIAL DECOMPOSITION IN SEDIMENTS FROM LAKES AND PONDS IN SOUTHWEST GREENLAND (THE NARSSAQ AREA),
Copenhagen Univ. (Denmark). Inst. of Hygiene.
E. Fjerdingstad, and O. Berg.
Archiv fur Hydrobiologie, Vol 72, No 3, p 313-332, 1973. 7 fig, 4 tab, 40 ref.

Descriptors: *Bacteria, *Decomposing organic matter, *Sediments, Lakes, Ponds, Cellulose, Sulfur bacteria.
Identifiers: *Greenland(Narssaq).

The west Greenland lakes, where the influence of civilization is minimal, were investigated. Seventeen samples of sediment from lakes and ponds in the Narssaq area were examined bacteriologically, especially with a view to estimate cellulose decomposition and sulfur oxidation. The investigated area is situated on old geological formations. Some principal features of the climatic conditions are given. On the basis of examinations of mud from the River Tidal, it had been concluded that samples of mud yielded more reliable bacteriological evidence of the degree of faecal pollution than do water samples. Figures on the decomposition of cellulose are almost similar to those applying to many Danish Lakes, but the latter are not the maximum numerical values. Sulphur decomposition is insignificant as compared with most Danish lakes. The largest total sulphite reduction was ascertained for locality 6 (number of bacteria 4140/g). Sulphate reduction by Desulpho-vibrio desulfuricans appeared only in 8 samples out of the 17. Sulphur oxidation by members of the Thiobacillus family was ascertained only for three locations. (Jones-Wisconsin)
W74-10799

EFFECT OF WATER LEVEL FLUCTUATION ON LAKE VEGETATION,
Uppsala Univ. (Sweden).
N. Quennerstedt.
Verhandlungen Internationalen Vereiningung Limnologie, Vol 13, p 901-906, 1958. 2 fig, 8 ref.

Descriptors: *Aquatic plants, *Water level fluctuations, Lakes, Vegetation, Ecology, Benthic flora, Productivity.
Identifiers: *Zonation, *Sweden, *Lappland, Ronnback Lake(Sweden), Lake Gardiken(Sweden), Lake Hotagen(Sweden), Isoetes lacustris.

Water level fluctuation is important in the ecology of benthic lake vegetation, usually determining its zonation. In a natural lake the same seasonal water level variations recur so that zonal distribution of the different vegetation types is practically constant. Although a south Swedish lake shows the lower boundary of purely terrestrial vegetation as a distinct line, located at highest high water mark, it cannot be assumed that the same demarcation line in a north Swedish lake likewise corresponds to highest high water. Extreme high water can rise above this dividing line in many Lappland lakes without causing visible harm to the terrestrial vegetation. It is not clear how many days' submersion such land plants can stand. In Lake Hotagen there is a range of 3 m between controlled high water and low water causing pre-existing vegetation practically to disappear. Rooted vegetation is severely damaged, and all vascular plants exterminated, if the water level variations exceed a certain value. Considerable practical and financial problems have arisen in north Sweden as large increases in Sparganium species with long floating leaves, Ranunculus peltatus, etc., is likely to interfere severely with timber-floating operations and fishing. (Jones-Wisconsin)
W74-10801

DIURNAL PRIMARY PRODUCTION PATTERNS IN SEVEN LAKES AND PONDS IN ALBERTA (CANADA),
Calgary Univ. (Alberta). Dept. of Biology.
R. S. Anderson.
Oecologia (Berl.), Vol 14, p 1-17, 1974. 15 fig, 4 tab, 55 ref.

Descriptors: *Estimating, *Diurnal, *Primary productivity, Lakes, Ponds, *Canada, Surface waters, Solar radiation, Phytoplankton, Measurement.
Identifiers: *Alberta (Canada).

Relationships between production and insolation in lakes and ponds of different sizes and types were examined and relationship between daily production and short-term incubation assessed. A series of consecutive short-term experiments, using the C-14 radioisotope technique, indicated that diurnal primary production patterns were different for lakes and ponds. The upper 2 m of lakes showed marked early-morning and late-afternoon production maxima and midday depressions. Most lake series at depths over 2 m showed midday production maxima and a lag in the initiation of morning production. Relationship between fraction of total daily primary production and the fraction of total daily insolation for each incubation period was examined by calculating the correlation coefficients for these two sets of values. Estimation of total daily production by extrapolation from short-term midday production was fairly accurate for ponds but was less accurate and less consistent for lakes, especially in surface waters. Relative to solar radiation, extrapolations from short-term incubations near midday were likely to give underestimates to total daily net primary production. Difference in production patterns between lakes and ponds was likely due to differences in phytoplankton composition and greater seasonal and diurnal changes in physical and chemical conditions in the latter. (Jones-Wisconsin)
W74-10802

VERTICAL ENTRAINMENT INTO THE EPILIMNIA OF STRATIFIED LAKES,
Canada Centre for Inland Waters, Burlington (Ontario).
J. O. Blanton.
Limnology and Oceanography, Vol 18, No 5, p 697-701, 1973. 5 fig, 1 tab, 15 ref.

Descriptors: *Entrainment, *Epilimnion, *Stratification, Lakes, Mixing, Depth, Energy budget, Energy, Hypolmnion, Winds, Thermocline, Great Lakes, North America.
Identifiers: *Vertical entrainment.

Vertical entrainment and its effects on energetics and budgets was investigated in lakes with a wide geographical distribution in the northern temperate zone. Lakes are particularly suitable for studying entrainment because when local entrainments are integrated over the entire area, advective effects are eliminated and the problem is reduced to a single dimension. Entrainment rates in stratified lakes have practical significance because they may represent erosion and mixing of a hypolimnion having chemical and heat compositions different from those of the more turbulent

epilimnion. Entrainment of nutrients into the epilimnion could play a significant role by making nutrients available to algae, providing there was an adequate nutrient supply in the hypolimnion. Stratified lakes of widely different morphology show an inverse correlation between the average rates of water entrainment into the epilimnion and their average static stability during the period of epilimnion growth as long as wind energy input is the principal cause of the growth. The magnitude of entrainment depends to an extent on the lake's mean depth. Entrainment alters the potential energy of a lake and is one component of the mechanical energy budget. (Jones-Wisconsin)
W74-10803

PHOSPHATES IN SEDIMENTS OF PAMLICO ESTUARY,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
J. B. Upchurch, J. K. Edzwald, and C. R. O'Molia.
Environmental Science and Technology, Vol 8, No 1, p 56-58, 1974. 6 fig, 14 ref.

Descriptors: *Phosphorus, *Sediments, *Estuaries, Salinity, Iron, Freshwater, Clays, Silts, Absorption, *North Carolina.
Identifiers: *Pamlico Estuary(NC).

Amount of available phosphorus present in bottom sediments of North Carolina's Pamlico Estuary was plotted as a function of the distance downstream. The figure includes only those samples in which the percentage of clay and silt exceeded 85% and represents the changes from a freshwater to a saline environment. The term 'available phosphorus' refers to a fraction of the total phosphorus that is extracted using a procedure devised by Wentz and Lee. The amount of available phosphorus extracted from sediment samples was observed to decrease from 1.6 mg P/g sediment in fresh water to 0.3 mg P/g sediment in water with a salinity 18 ppt. The decrease in the available P and in the Fe-P correlation along the length of the estuary is consistent with the suggestion that P is held to suspended sediments by some type of Fe-inorganic P comples of limited stability. Suspended materials entering the estuary in the fresh water inflow could lose phosphorus to solution as they are transported through waters of increasing salinity to the mouth of the estuary. (Jones-Wisconsin)
W74-10804

PRIMARY PRODUCTION: FRESHWATER ECOSYSTEMS,
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
G. E. Likens.
Human Ecology, Vol 1, No 4, p 347-356, 1973. 3 tab, 39 ref.

Descriptors: *Primary productivity, Freshwater, *Measurement, *Eutrophication, Lakes, Rivers, Marshes, Photosynthesis, Swamps, Phytoplankton, Streams, Aquatic plants, Productivity, Analytical techniques.
Identifiers: Net primary productivity.

Although their areal and volumetric extent is relatively small, freshwater ecosystems are among the most productive on earth. About 16% of these are the large inland lakes of North America. Several have recently undergone dramatic changes that restrict man's usage, primarily because human activities in their drainage basins accelerate nutrient input. Photosynthetic fixation of carbon in freshwater ecosystems may occur in various kinds of communities, which may be grouped and identified by type of producer organism--phytoplankton, macrophytes, and periphyton. A variety of environmental factors, including availability of light and nutrients, grazing, temperature and substrate, regulate or limit net primary production in these diverse and complex ecosystems. Carbon may be fixed within these systems by phytoplankton, macrophytes, periphyton, or chemosynthetic microorganisms, or may be carried in, primarily as detrital organic matter, from drainage basins. Evaluation of these inputs and their regulating factors is important for predicting eutrophication trends. Through cultural changes, man accelerates nutrient inputs into lakes--from agricultural fertilizer, sewage, detergents, industrial wastes, atmospheric pollution--and greatly increases their biological productivity. The value of this increase depends on the characteristics of the plants which proliferate. (Jones-Wisconsin)
W74-10805

COMPUTER MODELING OF SEDIMENT AND PHOSPHORUS MOVEMENT INTO CANADARAGO LAKE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-10807

THE FINE STRUCTURE OF THE PERIPHYTON OF CHARA SP. AND POTAMOGETON NATANS FROM WYTHAM POND, OXFORD, AND ITS SIGNIFICANCE TO THE MACROPHYTE-PERIPHYTON METABOLIC MODEL OF R. G. WETZEL AND H. L. ALLEN,
Oxford Univ. (England). Dept. of Zoology.
B. R. Allanson.
Freshwater Biology, Vol 3, No 6, p 535-542, 1973. 2 tab, 6 plates, 15 ref.

Descriptors: *Morphology, *Periphyton, *Chara, Aquatic plants, Metabolism, Biological communities, Systematics, Electron microscopy, Diatoms, Primary productivity.
Identifiers: *Potamogeton natans, Wytham Pond(England), Wetzel-Allen model.

A model has been proposed which interrelates the various components of submerged aquatic plants and their covering periphyton or 'Aufwuchs.' Optical microscopic methods are limited because of the three dimensional structure of the association. The scanning electron microscope technique has greatly increased understanding of the fine structure of external surfaces and its application to this particular problem has proven very successful. The fine structure of the complex which supports and provides confirmatory evidence of the essential validity of Wetzel and Allen's original hypothesis is discussed. The periphyton-Chara sp. complex from Wytham Pond, Oxford, England was chosen at it provided a rich source of material heavily impregnated with calcium carbonate derived from the photosynthetic activity of the algal complex in the hard water of the pond. To demonstrate the nature of the association, material was prepared for optical, scanning and transmission electron microscopy. Of particular note is the manner in which the loosely woven diatomaceous component is held in place by a stranded matrix formed largely from the gelatinous stalks of varied structures which in places extends as a fragmented membrane above the calcareous deposits covering the cell wall. (Jones-Wisconsin)
W74-10808

NUTRIENT RETENTION IN SALT MARSH PLOTS EXPERIMENTALLY FERTILIZED WITH SEWAGE SLUDGE,
Boston Univ., Woods Hole, Mass. Marine Biological Lab.
I. Valiela, J. M. Teal, and W. Sass.
Estuarine and Coastal Marine Science, Vol 1, No 3, p 261-269, 1973. 6 fig, 3 tab, 21 ref. NSF GA-28365, NSF GA-28272.

Descriptors: *Nutrients, *Retention, *Tidal marshes, *Fertilization, *Sewage sludge, Tides, *Salt marshes, Nitrogen compounds, Phosphorus compounds, Regression analysis, Nutrient removal.

Growing population on the NW Atlantic coast has increased the contamination of coastal wetlands with sewage wastes. Effects of sewage on salt marsh ecocystems by experimentally treating salt marsh plots with sewage sludge was studied. Plots 10 m in diameter were fertilized once every two weeks with commercially available sewage sludge and nutrient losses measured in ebbing tidal water. The experimental plots were located in basins drained by single small ditches to allow sampling of ebbing tidal water from each plot. Concentration of ammonia nitrogen, nitrate + nitrite nitrogen, nitrite nitrogen, phosphate phosphorus and total phosphorus, respectively, in water leaving the treated plots was measured. Sea water temperature negatively affected phosphate phosphorus losses. Principal losses were in the form of ammonium and phosphate and were related to dosage applied and height of tide following application. Salt marsh systems are sufficiently flexible to use as much nitrogen as is available regardless of the supply mechanisms. They may act as effective removers of excess inorganic nitrogen. Results suggest that adequately managed salt marshes may be considered as potential tertiary treatment systems for sewage effluent. (Jones-Wisconsin)
W74-10809

OBSERVATIONS ON THE LIMNOLOGY AND PRIMARY PRODUCTION OF A SMALL MAN-MADE LAKE IN THE WEST AFRICAN SAVANNA,
Sussex Univ., Brighton (England). School of Biological Sciences.
J. D. Thomas, and P. J. Ratcliffe.
Freshwater Biology, Vol 3, No 6, p 573-612, 1973. 25 fig, 5 tab, 2 plates, 74 ref.

Descriptors: *Africa, *Limnology, *Primary productivity, *Artificial lakes, Grasslands, Systematics, Temporal distribution, Physicochemical properties, Spatial distribution.
Identifiers: *Ghana(Accra).

Research effort on small, artificial lakes or reservoirs in West Africa can be justified due to their importance in development of agriculture and fisheries and as foci of parasitic diseases. An account is given of limnology and primary production of a small man-made lake in the coastal savanna of Ghana. Observations were made between June 1958 and March 1960 on meteorological conditions and physicochemical factors. Water volume and surface area rapidly reach maximum values in the wet season despite the low runoff values. Minimum values occur in the dry season. Annual cycle in water temperature follows that of solar radiation. The ionic content of the water is low and dominated by bicarbonate, sodium, silica, and iron. The oxygen pulse is strong and phytoplankton photosynthetic activity is high during the dry season, whereas in the wet season the converse is true. Rooted vegetation became permanently established in the fish pond but not in the lake itself. Primary production in the water column is mainly by Myxophyceae and Bacillariophyceae and is low during dry seasons and very low in the wet seasons. Reasons for the low primary productivity levels are discussed. (Jones-Wisconsin)
W74-10810

DERIVATION OF DAILY PHYTOPLANKTON PRODUCTION ESTIMATES FROM SHORT-TERM EXPERIMENTS IN SOME SHALLOW, EUTROPHIC AUSTRALIAN SALINE LAKES,
Monash Univ., Clayton (Australia). Dept. of Zoology.
U. T. Hammer, K. F. Walker, and W. D. Williams.
Australian Journal of Marine and Freshwater Research, Vol 24, No 3, p 259-266, 1973. 1 fig, 1 tab, 23 ref.

Descriptors: *Data collections, *Phytoplankton, *Productivity, Analytical techniques, Shallow water, Eutrophication, Saline lakes, Photosynthesis, Diurnal, *Australia.

Identifiers: *Short-term experiments.

Several experiments, involving a series of short-term exposures during which radiation data were recorded, are reported and relative efficacy of various conversion factors examined. Experiments were conducted in 1970 in three shallow, saline, eutrophic lakes near Colac in western Victoria. Measurement of phytoplankton production typically involves short-term (3-6 hr) experiments; some means of conversion is then applied to yield estimates of daily production. On the basis of C-14 experiments, several means of making such conversions are compared. Day-long (12 hr) exposures tended grossly to underestimate the 'true' daily production as measured by the cumulative results of consecutive short-term experiments. Conversions based on half-day exposures and on radiation data were about equally effective, although both may involve uncertainties of at least 25%. Conversion factors derived from short-term v. cumulative results varied seasonally and even over short periods of time, apparently in accord with variable biological and meteorological conditions. To minimize errors short-term experiments should include the midday period when possible. (Jones-Wisconsin)
W74-10812

TOXIC EFFECTS OF FRESHWATER TURBELLARIANS ON SCHISTOSOME MIRACIDIA,
Cincinnati Univ., Ohio. Dept. of Biological Science.
R. J. Glaudel, and F. J. Etges.
J Parasitol. Vol 59, No 1, p 74-76, 1973.
Identifiers: Cura-Foremanni, Dugesia-Dorotocephala, Dugesia-Tigrina, Gigantobilharzia-Huronensis, Phagocata-Morgani, Schistosoma-Mansoni, *Schistosome miracidia, *Turbellarians, *Toxicity, *Planarian worms, Biocontrol.

While previous work has shown that planarian worms have toxic action on trematode miracidia, the present study was designed to detect quantitative differences in such activity, using 4 different planarian species against 2 species of schistosome miracidia. Differences were detected on the basis of the duration of exposure required to kill or immobilize 50 plus or minus 10% of exposed miracidia. The planarians, Cura foremanni, Dugesia tigrina, D. dorotocephala and Phagocata morgani were each tested against miracidia of Schistosoma mansoni and Gigantobilharzia huronensis. D. dorotocephala was more toxic than C. foremanni, D. tigrina and P. morgani were least active and there was an apparent difference in susceptibility to such toxic action between S. mansoni and G. huronensis. These laboratory data suggest that careful selection of the most actively toxic species of planarian would be required if such organisms were to be employed as biological control agents against schistosome miracidia.--Copyright 1973, Biological Abstracts, Inc.
W74-10830

STUDIES ON THE EFFECTS OF THE ORAL ADMINISTRATION OF DI-(2-ETHYLHEXYL) PHTHALATE ON SOME HEPATIC ENZYMES IN THE RAT,
British Industrial Biological Research Association, Carshalton, Surrey (England).
B. G. Lake, S. D. Gangolli, M. G. Wright, P. Grasso, and A. G. Lloyd.
Biochemical Society Transactions, Vol 2, No 2, p 322-325, 1974. 2 tab, 5 ref.

Descriptors: *Water pollution effects, *Toxicity, Sea water, Laboratory tests, Laboratory animals, Animal physiology, *Animal pathology, Environmental effects, Rodents, Organic compounds.
Identifiers: Di-(2-ethylhexyl)phthalate, *Phthalate esters.

A toxicological study was conducted on the safety evaluation of di-(2,-ethylhexyl)phthalate, a commonly used phthalate ester, specifically investigating the biochemical and histochemical effects on the liver of rats after oral administration. Metabolic studies conducted on young male Wistar albino rats with the ester at single oral doses of 20 mg/kg and 2000 mg/kg and seven daily doses of 200 mg/kg, showed that 98-99 percent of the radioactivity was excreted within four days. The study of the hepatic effects was conducted in rats by the daily gastric intubation of the phthalate ester dissolved in corn oil, at a dosage of 200 mg/kg for 4, 7, 14, and 21 days respectively. The results of the study, showing that the effects of di-(2-ethylhexyl)phthalate on the rat hepatic mitochondrial and microsomal enzymes are not wholly reproducible by either phthalic acid or 2-ethylhexan-1-ol, indicate that other metabolites of di-(2-ethylhexyl)phthalate may contribute to the biochemical effects. (Sandoski-FIRL)
W74-10885

UPTAKE OF CHLOROBIPHENYLS BY OYSTERS,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5B.
W74-10889

THE EFFECT OF NITRITES ON ISOLATION-INDUCED AGGRESSION IN MICE,
Hadassah Medical School, Jerusalem (Israel). Environmental Health Lab.
N. Gruener.
Pharmacology Biochemistry and Behavior, Vol 2, No 2, p 267-269, March-April, 1974. 2 tab, 6 ref.

Descriptors: *Laboratory animals, Potable water, *Nitrites, *Animal behavior, Laboratory tests, *Rodents, *Isolation, Water pollution effects.
Identifiers: *Sodium nitrite, Animal isolation, Mice, Agression(Animals).

Chronic administration of sodium nitrite, one gram per liter, in drinking water of pregnant mice and their offspring caused a significant increase in the isolation-induced agression of the male young. The cessation of administration of sodium nitrite reduced the agressive behavior of the experimental group to the control level. Since nitrates and nitrites are frequently ingested in human drinking water, health implications are cited. (Sandoski-FIRL)
W74-10892

ENVIRONMENTAL INFLUENCES ON OFFSHORE FACILITIES,
National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
For primary bibliographic entry see Field 6G.
W74-10898

ASBESTOS-LIKE FIBERS IN DULUTH WATER SUPPLY, RELATION TO CANCER MORTALITY,
National Cancer Inst., Bethesda, Md. Epidemiology Branch.
T. J. Masson, F. W. McKay, and R. W. Miller.
Journal of the American Medical Association, Vol 228, No 8, p 1019-1020, May 20, 1974. 1 tab, 6 ref.

Descriptors: *Water supply, *Asbestos, *Statistical methods, Industrial wastes, *Minnesota, Potable water, Water pollution effects.
Identifiers: *Cancer, *Carcinogenesis, *Duluth(Minn).

Asbestos-like fibers in industrial waste first entered the water supply of Duluth, Minnesota, in 1966. During the next 14 years, no carcinogenic effect was apparent in the patterns of cancer mortality among persons of all ages, or among children. However, the period of observation is short relative to the latent period for occupationally induced carcinogenesis from asbestos. A longer period of follow up than was possible in this study will be necessary before it can be concluded that there is no cancer hazard related to the drinking water supplies of Duluth and its neighboring communities. (Shaffer-FIRL)
W74-10900

5D. Waste Treatment Processes

WASTEWATER TREATMENT AND DISCHARGE SURVEY, OFFUTT AFB NE, OCT 1973,
Environmental Health Lab., Kelly AFB, Tex.
C. W. Bullock, and E. E. LeFebvre.
Available from NTIS, Springfield, Va. 22161 as AD-769 489, Price $4.75 printed copy; $2.25 microfiche. Air Force Environmental Health Laboratory Technical Report, 1973. 150 p, 23 fig, 35 tab, 16 ref, 9 append.

Descriptors: *Waste treatment, *Waste water treatment, *Waste water disposal, *Military reservations, *Nebraska, Surveys, Water pollution control, Sanitary engineering.
Identifiers: *Offutt Air Force Base(Neb).

An onsite survey of waste treatment was made of Offutt AFB, Nebraska 1-12 May 1972, to determine the quality and quantity of domestic and industrial wastewaters generated on base, determine the effectiveness of existing treatment facilities, and provide recommendations for treating the base's large volume of photographic processing wastes. Removal efficiencies for BOD and suspended solids in the plant meet current Nebraska criteria. However, recommendations were made to increase recirculation ratios and provide post-chlorination in order to improve plant treatment efficiency without requiring any major plant modifications. Industrial wastewaters from photographic processing, aircraft and equipment washing, and potable water treatment are discharged to Papillion Creek with little or no treatment. Improved pretreatment of these wastes with ultimate treatment and discharge through the domestic treatment system are recommended. (Knapp-USGS)
W74-10355

PORT COLLECTION AND SEPARATION FACILITIES FOR OILY WASTES, VOLUMES I-IV,
Harris (Frederic R.) Inc., New York.
R. L. Forster, J. E. Moyer, and S. I. Firstman.
Available from NTIS, Springfield, Va. 22161 as COM-73-11068-71, Price $6.75 printed copy; $2.25 microfiche. Frederic R. Harris, Inc., Consulting Engineers Final Contract Report MA-RD-900-73026, for the Maritime Administration, 1973 (4 vol). Total pages 877. Contract No 2-36202.

Descriptors: *Waste water treatment, Design, *Treatment facilities, *Oil pollution, *Water pollution control, *Harbors, *Oily water, Oil spills, *Separation techniques, Ships, Water pollution treatment.

Facilities for control of oil pollution of harbors are described. The types of oil wastes brought into selected ports by non-military shipping are identified. Estimates are given of quantities of oil wastes, based on total prohibition of overboard dumping. Designs for collecting, treating and disposing of the oil wastes with no additional environmental degradation are given for selected ports. The roles of Government are explored, the impact on shipping is evaluated and the overall viability of the concept discussed. It is intended that this report serve as a guide for any U.S. port contemplating a Port Collection and Separation Facility. (Knapp-USGS)
W74-10357

STATE OF THE ART REPORT ON MARINE SANITATION DEVICES,
Automation Industries, Inc., Silver Spring, Md. Vitro Labs. Div.
J. M. Rosenbusch.
Available from NTIS, Springfield, Va. 22161 as AD-768 682, Price $4.75 printed copy; $2.25 microfiche. Final Contract Report to US Coast Guard, June 1973. 157 p, 63 fig, 4 tab, 5 ref, 2 append. Contract DOT-CG-32785-A.

Descriptors: *Waste water treatment, *Sewage treatment, *Waste water disposal, *Ships, Sewage disposal, *Reviews, Research and development, Boats, Boating, Recreation, Recreation wastes.
Identifiers: *Marine sanitation devices.

A state-of-the-art study on marine sanitation devices (MSD) describes the problem of disposal of wastewater from recreational, commercial, and military vessels, with particular emphasis on recreational vessels. A summary of MSD's which are commercially available and a breakdown of MSD research, development, test and evaluation (RDT and E) programs being funded by the Federal government and private agencies are presented. Vessel limitations and constraints are analyzed and the suitability of the various MSD systems is compared to the vessel requirements. The major problems of wastewater treatment both onboard recreational, commercial, and military vessels and at dockside and the technical and economic factors that must be considered in the selection of a marine sanitation device are discussed. (Knapp-USGS)
W74-10360

MANAGEMENT OF URBAN STORM RUNOFF,
Water Resources Engineers, Walnut Creek, Calif., and Hydrologic Engineering Center, Davis, Calif.
M. B. McPherson, G. T. Orlob, D. F. Kibler, C. W. Chen, and R. P. Shubinski.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 316, $4.00 in paper copy, $2.25 in microfiche. American Society of Civil Engineers, Urban Water Resources Research Program Technical Memorandum No. 24, New York, N.Y., May, 1974, 92 p, 17 tab, 33 fig, 118 ref. OWRR C-4048(No 9009)(7).

Descriptors: *Urbanization, *Project planning, Pollution abatement, *Rainfall-runoff relationships, Pollutants, *Storm drains, Water pollution sources, Hydrograph analysis, Hydrologic aspects, Impaired water quality, Erosion control, Detention reservoirs, Computer models, Control systems, Estimated costs, Design storm, *Urban runoff, *Storm runoff, Storm water, *Urban drainage, Management, Cities.
Identifiers: *Stormwater treatment, Pollutographs, Receiving waters, Metropolitan studies, Storm sewer discharges, Combined sewer overflows.

The Hydrologic Engineering Center, Corps of Engineers, U.S. Army, sponsored a training course on 'Management of Urban Storm Water, Quantity and Quality' at its facilities in Davis, California, in February, 1973. Water Resources Engineers of Walnut Creek, California, conducted the course for the Center. This report contains eight of the fifteen course lectures, on the following topics: An Overview of Urban Storm Drainage; by G. T. Orlob; Hydrologic Effects of Urbanization and the Factors Controlling Urban Runoff, D. F. Kibler; Effects of Urban Runoff on Receiving Waters, by C. W. Chen; Concepts of Urban Storm Runoff Control, by R. P. Shubinski; Stormwater Treatment Process, by J. A. Lager; Storage of Urban Runoff, by J. A. Lager; Stormwater Treatment Versus Storage, by R. P. Shubinski; and, Design of Stormwater Drainage systems, by M. B. McPherson. Much of the content has not appeared elsewhere or is from limited-distribution project reports. Aside from its value as a unique information source, this report is suitable for use as a text or manual. Three other lectures are subsumed in a companion report that documents a computer model for preliminary evaluation of runoff-quality in metropolitan master planning. (See W74-10396) (McPherson-ASCE)
W74-10395

A MODEL FOR EVALUATING RUNOFF-QUALITY IN METROPOLITAN MASTER PLANNING,
Water Resources Engineers, Walnut Creek, Calif.; Hydrologic Engineering Center, Davis, Calif.; San Francisco City and County Dept. of Public Works, Calif.
L. A. Roesner, H. N. Nichandros, R. P. Shubinski, A. D. Feldman, and J. W. Abbott.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 312, $4.00 in paper copy, $2.25 in microfiche. American Society of Civil Engineers, Urban Water Resources Research Program Technical Memorandum No. 23, New York, N.Y., April, 1974, 73 p, 19 tab, 25 fig, 13 ref. OWRR C-4048(no 9009)(6).

Descriptors: *Urbanization, *Project planning, *Computer models, *Pollution abatement, *Rainfall-runoff relationships, *Feasibility studies, *Storm drains, Water pollution sources, Hyetographs, Forecasting, Detention reservoirs, Land use, Frequency analysis, Pollutants, Erosion, *Comprehensive planning, *California.
Identifiers: Master planning, *Metropolitan studies, *Stormwater treatment, Storm sewer discharges, Combined sewer overflows, User's manuals, San Francisco(Calif).

Documented is a computer model that should see extensive use in total-jurisdiction preliminary master planning for abatement of pollution from storm sewer discharges and combined sewer overflows. It is presently the outstanding tool available for that purpose. The computer program and a user's manual are available to the public. Water Resources Engineers (WRE) employed the initial version of the model in part of the development of the Department of Public Works, City and County of San Francisco, Master Plan for combined sewer overflow abatement, using 62-years of hourly rainfall data. WRE developed a more comprehensive version for The Hydrologic Engineering Center, Corps of Engineers, as part of a training course, the version documented. Examples of planning applications are included, together with samples of computer output for a San Francisco drainage area including summary and event statistics for rainfall, storage, overflow, treatment and quality. Data processing for planning applications is a much more practical consideration than the level of sophistication of hydrological process modeling, just the opposite of the emphasis required for design applications. Related management issues are presented in a companion report. (See W74-10395) (McPherson-ASCE)
W74-10396

ANALYSIS OF A DUAL MODE DESALINATION SYSTEM FOR NAVAL BASES,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 3A.
W74-10404

PLANNING AND WASTEWATER MANAGEMENT OF A COMBINED SEWER SYSTEM IN SAN FRANCISCO,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
N. S. Grigg, W. R. Giessner, R. T. Cockburn, H. C. Coffee Jr., and F. H. Moss, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 334, $3.75 in paper copy, $2.25 in microfiche. Metropolitan Water Intelligence Systems, Technical Report No 10, June, 1973, 52 p, 15 fig, 28 ref, 2 append. OWRR C-4172(No 9028)(2).

Descriptors: *Control systems, *Sewers, *Storm runoff, *Overflow, Water pollution control, Storage, Detention, Reservoir operation, Computer applications, Systems engineering, Automatic control, Utilities, *California, *Combined sewers, Waste water treatment.
Identifiers: Urban water systems, Control logic, Wet weather control, Waste water management, *San Francisco(Calif).

A plan in San Francisco is described which recommends a control system for a combined sewer system. San Francisco's water quality management problems make an excellent case study for many aspects of this research investigation. The report is essentially a resource paper which abstracts the 3-volume San Francisco 'Master Plan for Wastewater Management', prepared in September 1971. Although this Master Plan has not yet been implemented, a great deal of the methodology developed and the data produced should be of value to urban water managers who face problems similar to San Francisco's. The criteria and procedure used in developing the 1971 Master Plan are presented. Skeletal portions of the data used and the descriptive features of the Master Plan itself are included. The goals of the work envisioned by the Master Plan are to solve three basic problems: water quality impairment by dry weather effluent, by wet weather overflows and drainage problems on city streets. From these goals the report shows the Master Plan procedures within the framework of a systems engineering process. The formulation of objectives, establishment of measures of effectiveness, formulation of alternatives, evaluation of alternatives and recommendation of a basic plan are demonstrated.
W74-10413

OPTIMIZATION TECHNIQUES FOR MINIMIZATION OF COMBINED SEWER OVERFLOW,
Dept. of Civil Engineering. Colorado State Univ., Fort Collins.
J. W. Labadie.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 331, $4.00 in paper copy, $2.25 in microfiche. Metropolitan Water Intelligence Systems, Technical Report No 11, June, 1973. 79 p, 5 fig, 30 ref, 1 append. OWRR C-4172(No 9028)(3).

Descriptors: *Control systems, *Sewers, *Storm runoff, *Overflow, *Optimization. Water pollution control, Operations research, Storage, Detention, Reservoir operation, Mathematical models, Algorithms, Computer applications, Systems engineering, Automatic control, Dynamic programming, Nonlinear systems, *Combined sewers, Waste water treatment.
Identifiers: Combined sewer systems, *Mathematical programming, Optimal control theory, Nonlinear programming, Decomposition.

Methods of developing control logic for automated operation of ambient and/or auxiliary storage capabilities within combined sewer systems, with the objective of minimizing overflows to receiving waters, are analyzed and evaluated. The enormous number of control opportunities requires that the control problem be formulated as an optimization problem. The problem is defined as one of minimizing total weighted overflows, subject to an assumed hydraulic model describing flow and storage dynamics, as well as other physical constraints. The optimization problem tends to increase in complexity and degree of nonlinearity as more realistic flow models are utilized. It is concluded that finite-dimensional optimization techniques appear to have greater potential for effective solution, over infinite-dimensional techniques (i.e., application of continuous-time optimal control theory). The primary reasons are (i) difficulty of obtaining solutions by the latter, (ii) operation of the real system in discrete time. Within the context of finite-dimensional optimization, an approximate-flow technique is presented

which significantly reduces the total number of variables involved in the problem.
W74-10415

AN ION-EXCHANGE PROCESS FOR RECOVERY OF CHROMATE FROM PIGMENT MANUFACTURING,
Mineral Pigments Corp., Beltsville, Md.
D. J. Robinson, H. E. Weisberg, G. I. Chase, K. R. Libby, Jr., and J. L. Capper.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 641, $4.50 paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio, Technology Series Report EPA-670/2-74-044, June 1974. 91 p, 21 fig, 23 tab, 20 ref. 1BB036:ROAP 21 AZQ: Task 03 EPA Project 12020 ERM.

Descriptors: *Industrial wastes, *Ion exchange, *Pigments, Resins, *Waste water treatment, Adsorption, Treatment facilities, Chromium, Zinc.
Identifiers: *Chemical manufacturing wastes, Materials recovery.

Strongly basic ion-exchange resins have been shown to exhibit a preference for dichromate over many other anions in water solution. Laboratory studies were conducted to show that this ion preference could be used to remove chromate from waste waters which were discharged from a zinc yellow pigment manufacturing plant. It was also shown that the recovered chromate solution could be recycled into product manufacture without sacrificing product quality. From these laboratory studies, a full-scale ion-exchange treatment plant was designed, constructed, and demonstrated. The chromate composition of the plant effluent is being reduced from 2700 ppm to one to two ppm. The treatment system was designed to treat 60 gallons per minute of influent and to discharge an effluent which is within statutory limits for pH and for heavy metal content. The plant was designed to require minimal manual supervision. The steps in treatment and in resin regeneration are performed automatically and the control system is interlocked to make it fail safe. Operators are required only to make up regeneration solutions, to clean pump strainers and filters, to answer to alarms and occasionally to differentiate between turbidity and color as seen by a colorimeter. (EPA)
W74-10423

DEVELOPMENT OF A BATCHWISE IN-SITU REGENERATION TYPE SEPARATOR TO REMOVE OIL FROM OIL-WATER SUSPENSIONS,
Hydronautics, Inc., Laurel, Md.
D. Fruman, A. Gollan, and J. Ricklis.
Available from NTIS, Springfield, Va 22151 as COM-73-11109, Price $3.00 printed copy; $2.25 microfiche. Final Technical Report 7080-2, Phase II (Maritime Administration Report MA-RD-900-73025), February 1973. 111p, 39 fig, 13 tab. USDC-MA Contract C-0-35467, Phase II.

Descriptors: *Separation techniques, *Oily water, *Waste water treatment, Ships, Water pollution control, Filtration, *Foam separation.

An oil-water separator was designed, built, and tested on simulated oil-water suspensions. The system operates batchwise at 40 gpm. A section of 60 PPI polyurethane foam is situated in the central portion of the separator between two perforated plates. One plate is stationary and the other is free to move in order to squeeze the foam. The contaminated water enters the upstream section and is evenly distributed. The contaminated water flows through the foam, where the oil is retained or coalesced depending on the degree of saturation of the foam. The effluent leaving the filtration section is discharged into the downstream compartment of the separator where large droplets of coalesced oil are separated by gravity. At a certain level of oil saturation, the pressure drop across the foam increases to such an extent that filtration is no longer possible. The filtration is then stopped and regeneration of the foam is accomplished by squeezing with the moving perforated plate actuated by a hydraulic cylinder. Continuous filtration times as long as 14 hours were obtained with crude and No 6 fuel oils as contaminants. These periods exceed normal deballasting operation periods. Reticulated polyurethane foam is the most promising filter media having the best combination of scavenging and regeneration properties. (Knapp-USGS)
W74-10441

TEST AND EVALUATION OF OIL POLLUTION ABATEMENT DEVICES FOR SHIPBOARD USE, PHASE II,
Coast Guard, Washington, D.C. Naval Engineering Div.
L. B. Norton.
Available from NTIS, Springfield, Va 22161 as AD-762 499, Price $3.00 printed copy; $2.25 microfiche. October 1972. 22 p.

Descriptors: *Separation techniques, *Oily water, *Ships, *Oil pollution, Water pollution control, Equipment, Filters, Filtration, Pumps, Coalescence, *Waste water treatment.

Two filter-coalescer separators designed to remove oil from water were evaluated at a shore-based test facility. Freshwater and saltwater contaminated with various oils and dust, were used to simulate bilge and ballast processing conditions. One separator rated at 25 gpm produced an acceptable water effluent when tested with a low-emulsifying pump but proved unsatisfactory with a centrifugal pump. An improved 100 gpm separator produced an acceptable water effluent when tested with a centrifugal pump. The effluent was acceptable except for short periods of marginal performance which were noted during tests involving crankcase drainings. (Knapp-USGS)
W74-10444

PROCESS OF DEWATERING SEWAGE SLUDGE AND CONVERTING THE SAME TO A USEABLE PRODUCT,
Calspan Corp., Buffalo, N.Y. (assignee)
R. E. Baier.
U S Patent No 3,804,753, 2 p, 4 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 1149, April 16, 1974.

Descriptors: *Patents, *Activated sludge, *Dewatering, *Wastewater treatment, Pollution abatement, Butanol, Sewage sludge, Sludge treatment.
Identifiers: *Chemical treatment.

The wet activated sludge is placed in a container of a particular shape. A water displacing ingredient, such as technical grade butanol, is distributed over the top of the sludge and water percolates through the sludge over a period of time. In addition to its water displacing function, it also provides sterilization of the sludge. The dehydrated sludge is receptive to infiltration with organic materials including organic monomers and other solid-precursor type chemicals, and may be converted to a useable product. (Sinha-OEIS)
W74-10445

CONTACT STABILISATION--A PROCESS WITH A FUTURE.,
Permutit Co. Ltd., London, (England). Pollution Control Dept.
J. E. Goddard.
Water Services, Vol 78, No 935, p 16-17, January, 1974.

Descriptors: *Sludge treatment, *Biochemical oxygen demand, Suspended solids, Water quality standards, Activated sludge, Aeration, Sewage treatment, Chemical oxygen demand, Nitrification, Waste water treatment.
Identifiers: *Contact stabilization, *United Kingdom(England).

The contact stabilization process, which was one of the earliest developments in the application of bichemical engineering to sewage treatment, is described. The process employs two aeration zones separated by a secondary clarification tank. Raw sewage and activated sludge are aerated together in the first zone, known as the contact zone, for a short period after which the mixed liquor is passed to the settlement stage. At this point the treated sewage can be discharged, being below the normal Royal Commission standard of 20/30 i.e., BOD5 less than 20 mg/liter and suspended solids less than 30 mg/liter. Most plants give an effluent of around the 10/15 standard. The sludge from the settlement stage is returned for further aeration before being mixed with more raw sewage in the contact zone. Such a plant is smaller than an equivalent conventional plant by a factor of nearly two. The development of the process was somewhat empirical but was based on the observation that the initial removal rates of organic matter by activated sludge was very high. The most important factor in the contact stabilization process is that the two phases of the reaction are separated and this leads to more efficient and quicker purification. (Merritt-FIRL)
W74-10451

WASTE NEUTRALIZATION CONTROL - DIGITAL SIMULATION SPOTS NONLINEARITIES,
Cincinnati Univ., Ohio.
J. D. Richter, C. D. Fournier, R. H. Ash, and S. Marcikic.
Instrumentation Technology, Vol 21, No 4, p 35-40, April, 1974. 8 fig, 8 ref.

Descriptors: *Model studies, *Hydrogen ion concentration, *Waste water treatment, Mathematical models, Treatment facilities, Control, *Neutralization, *Simulation analysis.
Identifiers: *Waste neutralization.

A generalized model of the effect of influent composition variations on pH control was designed to study performance in a treatment plant before installation of equipment. It was found that in the nonlinear situation there is no simple functional relationship between concentration of a single ionic species and pH. Equilibrium calculations based on mass balances for each component are required to predict the reasons. (Murphy-FIRL)
W74-10454

ANOTHER UNUSUAL SEWERAGE PROBLEM SOLVED WITH DUCTILE IRON PIPE,
For primary bibliographic entry see Field 8A.
W74-10455

INORGANIC NITROGEN REMOVAL IN A COMBINED TERTIARY TREATMENT-MARINE AQUACULTURE SYSTEM--I. REMOVAL EFFICIENCIES,
Woods Hole Oceanographic Institution, Mass.
J. C. Goldman, K. R. Tenor, J. H. Ryther, and N. Corwin.
Water Research, Vol 8, No 1, p 45-54, 1974. 5 fig, 6 tab, 34 ref.

Descriptors: *Recycling, Water conservation, Water pollution treatment, *Water reuse, Sewage treatment, *Tertiary treatment, *Food chains, Food webs, Ecosystems, Algae, Oysters, Nitrogen, *Waste water treatment, *Phosphorus.
Identifiers: *Nitrogen removal.

The transformations of nitrogen and phosphorus were observed during the Summer and Fall of 1972 in a prototype process consisting of growth systems for marine algae, oysters, and seaweed, joined in series and fed secondarily-treated wastewater diluted 1:4 with seawater for 11 weeks. Dur-

g this time 95% of the influent inorganic nitrogen as removed by algal assimilation. Thy oysters in m removed 85% of the algae, but regenerated as luble ammonia 16-18% of the nitrogen originally und in the algal cells. All of the regenerated rogen was removed in the seaweed system so at the total inorganic nitrogen removal efficiency the system was 95%. Phosphorus removal was t nearly as complete as only 45-60% was moved. The process has the capability of being panded to include additional trophic levels in an egrated and highly controlled food chain system serve the dual function of tertiary wastewater atment and waste recycling through the produc- n of shellfish and seaweeds. (Merritt-FIRL)
74-10462

ESSURE SEWER DEMONSTRATION,
ew York State Dept. of Environmental Conser- tion, Albany.
G. Carcich, L. J. Hetling, and R. P. Farrell.
urnal of the Environmental Engineering Divi- n, American Society of Civil Engineers Vol 0, No EE1, p 25-40, Paper 10315 February, 1974. ig, 4 tab, 17 ref.

scriptors: *Sewers, Pipes, Engineering struc- es, *Drains, Sewage disposal, *Pumps.
entifiers: *Gravity sewers, *Pressure sewers.

e pressurized wastewater collection concept s evaluated by installing 12 Grinder Pump (GP) its in a pressurized sewer system and observing ir operation for a 13-month period. The waste- ter was collected and conveyed in the normal nner by the building drainage system to the nder pump unit's tank. From the grinder pump it was discharged through a 1 1/4 inch plastic pe pressure lateral to an outside plastic pressure in, 1 1/4 to 3 inches in size. The pressure main ceived the macerated wastewater from all 12 its and discharged it into a gravity system within city. The hydraulic design is a critical facet of y new pressure sewer system. Some grease ac- mulation can be expected, but when design locities are kept between two fps and five fps, cessive accumulations apparently will be evented. Commercially available shut-off valves ould be installed immediately downstream on discharge pipe in order that the GP unit can be lated from the presure system for mainateance d repair work. The costs for the different com- nents and installation can vary from $1620 to 438 per unit depending on specific needs. It is ncluded that GP units are meant to be a supple- ental tool in any wastewater collection system d not a replacement for the conventional avity-fed) wastewater collection system. erritt-FIRL)
74-10463

NITRIFICATION IN GRANULAR CARBON ND SAND COLUMNS,
tional Environmental Research Center, Cincin- ti, Ohio.
N. English, C. W. Carry, A. N. Masse, J. B. kin, and F. D. Dryden.
urnal Water Pollution Control Federation, Vol No 1, p 28-42, January, 1974. 13 fig, 5 tab, 1 .

scriptors: *Pilot plants, Effluents, Waste treat- nt, *Sewage treatment, Carbon, enitrification, Chemical oxygen demand, Mu- ipal wastes, *Waste water treatment.
entifiers: *Granular carbon, *Sand columns, generation.

e denitrification of secondary effluent in granu- carbon and sand columns was investigated in a ir stage, fixed bed, 0.3 mgd pilot plant. The ef- t of denitrification on column operation, COD noval efficiency, and carbon regeneration was termined. Supplementary nitrate was added to condary effluent during two carbon column ad- rption sequences to obtain average concentrations of 25.8 and 21.8 mg/liter NO3-N. There were removals of 80 and 92%, respectively, with most of the denitrification occurring in the first stage (10 minutes detention time) and 3-4 mg/liter NO3-N removed, without methanol in the subsequent stages. The methanol requirement was 1.9 times the NO3-N removed plus 1.1 times the dissolved oxygen removed. There was no significant impairment of the carbon's ability to remove COD in either adsorption sequence, and removals of 72% of COD in the first sequence and 66% in the second were within the expected range. Biological growth made backwashing necessary twice a day and headlosses average 30 to 50 psi after less than 12 hours of operation. The total cost of a 10 mgd plant using sand as the media was estimated at $71/million gallon. If denitrification is combined with dissolved organic removal in an activated carbon system, the additional cost for denitrification was estimated to be $25/million gallon. (Merritt-FIRL)
W74-10465

SMALL TOWN GETS AN EFFICIENT WASTE SYSTEM,
Male (C. T.) Associates, Schenectady, N.Y.
D. W. Geisinger, and M. A. Mastropietro.
Water and Wastes Engineering, Vol 11, No 1, p 32-34, January, 1974.

Descriptors: *Treatment facilities, *Activated sludge, *Anaerobic digestion, *Aeration, *Costs, Biochemical oxygen demand, Suspended solids, *Sewage treatment, New York, Municipal wastes, *Wastewater treatment.
Identifiers: *Niskayuna(NY).

The efficient secondary wastewater treatment facilities installed in Niskayuna, New York, are described. The new plant is rated at 1.5 mgd capacity, uses the conventional activated sludge process with anaerobic digestion of waste sludges, and supplements the original plant constructed in 1966. The improved facility consists of a coarse bar rack, aerated grit chamber, comminutor chamber, primary settling tanks (2), aeration tanks (2), parshall flume meter chamber, secondary settling tanks (2), chlorine contact tanks (2), air flotation thickener, anaerobic sludge digesters (2), and sludge drying beds. The existing primary settling tanks were converted to secondary settling tanks by minor modifications. A second anaerobic digester was added with floating gasholder to provide the added sludge handling capacity. The cost totaled $980,000 with construction amounting to $894,750. The plant serves approximately 5000 people, or 1/3 of the design population. The only problems with start up were grit removal and freezing in the winter. All secondary sludge was continuously returned at an average rate of 50%. Within two weeks, the MLSS was up to 2000 ppm, and BOD and suspended solids removal were in excess of 80 percent. In the first five months of 1973, BOD efficiency varied from 90-95%, while SS removal efficiency ranged from 89 97%. (Merritt-FIRL)
W74-10466

EFFECTS OF EQUALIZING WASTEWATER FLOWS,
Drexel Univ., Philadelphia, Pa.
M. D. LaGrega, and J. D. Keenan.
Journal Water Pollution Control Federation, Vol 46, No 1, p 123-132, January, 1974. 6 fig, 5 tab, 8 ref. EPA 14-12-598.

Descriptors: *Activated sludge, Municipal wastes, Municipal water, Treatment facilities, *New York, Efficiencies, Sanitary engineering, Aeration, *Biochemical oxygen demand, *Chemical oxygen demand, *Waste water treatment.
Identifiers: *Wastewater flow, *Newark(NY).

The effects of equalizing wastewater flows on treatment efficiency was investigated in a full scale study at the Newark, New York, activated sludge plant. The plant treats an average flow of approximately 1.8 mgd. The first phase of the study characterized plant operation during normal flow conditions by reducing the plant to marginal operating conditions. During the second phase the raw flow was diverted to the second aeration tank for equalization. The total volume of the equalization tank was 412,000 gallons with an effective depth of 12 feet. The raw wastewater in the equilization tank was aerated to prevent sedimentation and avoid septic conditions. The results of a diurnal sampling program indicate rather poor primary removals in the first phase. Overall removal of BOD approached 90 percent, while COD and SS removals were about 75%. Primary removals of BOD and COD were only 12%, while SS were reduced by 23%. The only substantial difference in phase two was in the SS and VSS data. If the influent to the primary clarifier is compared with the effluent, the SS removal efficiency was 47%. It is concluded that the most significant change of composition occurring in the equalization tank is the reduction in diurnal variability and maximum concentration. (Merritt-FIRL)
W74-10467

CHLORINE FOR EFFLUENTS IN SHORT SUPPLY,
P. S. Ward.
Journal Water Pollution Control Federation, Vol 46, No 1, p 2-4, January, 1974.

Descriptors: *Chlorine, Water treatment, *Disinfection, *Municipal water, *Wastewater treatment, Chlorination.

The chlorine shortage is discussed as it relates to the disinfection of wastewater effluent, and solutions are suggested. The total sanitary usage for chlorine for 1973 is estimated at 460,000 tons. Manufacturers prefer industrial contracts to municipal ones because many cities are restricted by their charters from advertising for contracts that extend longer than one year or provide for periodic price escalations. Municipal buyers frequently include requirements for free extras (as containers) in their bid forms. Legislation may be required to allow manufacturers to break long-term industrial contracts in order to fill sanitary chlorine requirements preferentially. Manufacturers are generally committed by contract to 100 percent of their production and cannot legally allocate any fractions off the top to municipalities. The current policy is to supply 1973 contractees again in 1974, allowing reasonable increases. The questions of how to handle either new users or greatly increased demands on the part of old users have not been resolved. (Merritt-FIRL)
W74-10468

SURFLEET SEWERAGE SCHEME,
Water Services, Vol 78, No 935, p 13-14, January, 1974.

Descriptors: *Sewage treatment, *Treatment facilities, Pumping plants, Filters, Topography, Sewers, Pipes, Sludge, Equipment, Tertiary treatment, *Wastewater treatment.
Identifiers: Surfleet(UK), *United Kingdom(England).

The design and construction of the Surfleet, England sewage works is described. Because of the typical fenland topography, the area is served by a system of sewers, incorporating six pumping stations and associated rising mains. The bulk of the sewage flow discharges into the first pumping station at the center of the village from which point it is pumped to the sewage treatment works. A total of 5500 m of 225 mm diameter and 150 mm diameter pipes were laid to serve an existing population of 845 persons. The sewers have been designed on the separate system so that storm water has been excluded as much as possible. A new sewage treatment works has been constructed to the North of the village and consists of inlet works, settlement

tanks, hoppers, pumping stations, filter beds, and humus tanks. Provision has been made for incorporating tertiary treatment in the future. (Merritt-FIRL)
W74-10469

STUDY ON THE REMOVAL OF INORGANIC AND ORGANIC MERCURY IN WASTE WATER BY THE FLOTATION METHOD,
Kyoto Univ.,(Japan). Dept. of Mineral Science and Technology.
S. Mukai, and Y. Nakahiro.
Memoirs of the Faculty of Engineering Kyoto University, Vol 35, No 4, p 361-380, October, 1973. 20 ref.

Descriptors: *Wastewater treatment, *Flotation, *Mercury, Chemical precipitation, Water pollution control, Hydrogen ion concentration, Investigations, Organic compounds, Inorganic compounds, Chlorine, Water purification.
Identifiers: *Mercury compounds, *Japan, Iron hydroxide, Sodium sulfide, Sodium thiosulfate.

The removal of inorganic and organic mercury in waste water by the flotation method was investigated as part of intensive studies of water pollution control. Inorganic mercury was efficiently removed by the Fe(OH)3 coprecipitation flotation method with 80 mg/liter cumulative addition of ferric ions in the pH about 0 after the third stage flotation using sodium oleate as a collector. Sodium sulfide was added to the waste water to completely precipitate the mercury. Organic mercury was removed by decomposing the compound containing the organic mercury into inorganic mercury with gaseous chlorine, followed by the Fe(OH)3 coprecipitation-flotation method and the Fe(OH)3 coprecipitation Na2S precipitation flotation method. The optimum conditions were at a pH below 1. The removal of excess chlorine in the flotat on pump is important for a sucessful flotation of the precipitates. The excess chlorine was eliminated by 8 g/liter sodium thiosulfate or aeration over 40 min. Mercury decomposed by C12 gas was completely removed by the flotation method with an addition of 50-100 mg/liter ferric ions and 1 equivalent of sodium sulfide to the total amounts of mercury at pH 5.0-9.5. (Merritt-FIRL)
W74-10470

LONGBRIDGE SEWAGE TREATMENT WORKS.
Water Services, Vol 78, No 936, p 44-47, February, 1974.

Descriptors: *Sewage treatment, *Treatment facilities, Sludge treatment, Dewatering, Water quality standards, Effluents, Filtration, Flow, Sedimentation, *Biological treatment, Pumping plant· Filters, *Waste water treatment.
Iden' iers: Warwick(UK), Leamington Spa(UK), *Uni. d Kingdom(England).

The design and operation of the new joint sewage works at Longbridge for the Boroughs of Warwick and Leamington Spa, England are described. The works replaces the existing Warwick sewage works and will treat up to 60% of the flow from Leamington Spa. The works operates on the double filtration system of treatment involving two successive applications of settled sewage on to two sets of biological filters with intermediate sedimentation. The facilities consist of the following: inlet unit, flow separation and storm sewage treatment, primary sedimentation tanks, high level pumping station and main control room, primary filters and humus tanks, secondary filters and humus tanks, outfall, and sludge dewatering plant. The plant will meet the effluent standards prescribed by the Severn River authority. (Merritt-FIRL)
W74-10471

OXYGEN ACTIVATED SLUDGE SELECTED BY PHILADELPHIA,
Philadelphia Water Dept., Pa. Water Pollution Control Div.
M. D. Nelson.
Civil Engineering (American Society of Civil Engineers), Vol 44, No 4, p 42-45, April, 1974. 3 fig, 1 tab.

Descriptors: *Waste water treatment, *Pilot plants, Design criteria, *Activated sludge, Effluents, Aeration, Planning, Municipal wastes, Treatment facilities, Oxygen, *Pennsylvania.
Identifiers: *Philadelphia(Penn), *Oxygen activated sludge, Physical-chemical plants, Effluent standards.

The Philadelphia Water Department compared three different pilot treatment facilities at one site. These were an oxygen activated sludge unit, a conventional activated sludge unit, and a physical-chemical plant. Design criteria for the future were determined. It was felt that either biological plant could meet the effluent standards with the air plant giving more marginal performance. The oxygen activated sludge plant was also slightly lower in installed and operating costs. In a proposed site plan for the future plant, aerator tanks using pure oxygen will be placed downstream of existing primaries. The expanded plant will be highly automated, with on-site direct digital computer to monitor all processes of plant operation. (Prague-FIRL)
W74-10472

PHYSICO-CHEMICAL TREATMENT OF STRONG MUNICIPAL WASTEWATER,
Technion--Israel Inst. of Tech., Haifa. Environmental Engineering Labs.
M. Rebhun, and S. Streit.
Water Research, Vol 8, p 195-201, March 1974. 3 fig, 5 tab, 14 ref.

Descriptors: *Municipal waste water, *Biochemical oxygen demand, *Chemical oxygen demand, *Waste water treatment, Suspended solids, Effluents, Phosphates, Fats, Carbohydrates, Organic acids, Flocculation, Clarification.
Identifiers: *Physico-chemical treatment, *Israel.

Direct chemical flocculation--clarification of strong new waste water followed by adsorption on activated carbon has been investigated. The fate of specific organic components (low organic acids, carbohydrates, proteins, fats as well as BOD and COD) in the chemical treatment process was also studied. Excellent removals of phosphates, fats and suspended solids and a clear effluent were obtained in the chemical treatment. The clear 'primary chemical' effluent is, however, of high soluble organic content, the largest fraction being the soluble (low) organic acids and carbohydrates. Adsorption of the chemically treated waste water on activated carbon gave a 60 percent removal and a final effluent of a relatively high organic content including BOD. The high concentration of remaining organics is ascribed to poor adsorbability of the low organic acids anions on activated carbon. (Prague-FIRL)
W74-10473

COMPUTER OPERATED SEWAGE TREATMENT AT NORWICH.
Effluent and Water Treatment Journal, Vol 14, No 2, p 79, February, 1974.

Descriptors: *Sewerage, *Treatment facilities, *Administration, Waste water treatment, *Sewage treatment, Sludge digestion, Sludge disposal, Effluents, Solid wastes, Maintenance.
Identifiers: Norwich(UK), *United Kingdom(England).

The annual report of the City of Norwich Sewage Purification Works is summarized. Figures are given for total volume of sewage received at the works during the year, the average daily volume of raw sludge removed from the sedimentation tanks, average rate of application of settled sewage to biological filters, average daily volume of recirculated final effluent, solids loading of the sludge digestion plant, overall average reduction in total solids fed to the digestion plant, and the average daily flow of trade effluent. The final effluent quality failed to comply with the River Authoritys relaxed limits for most of the year. It was anticipated that the commissioning of four new humus tanks late in 1972 would contribute to some improvement. (Merritt-FIRL)
W74-10474

RESPIRATION AND DENITRIFICATION STUDIES ON LABORATORY AND WORKS ACTIVATED SLUDGES,
Upper Tame Main Drainage Authority, Birmingham (England).
G. W. Clayfield.
Water Pollution Control, Vol 78, No 1, p 51-76, 1974. 13 fig, 20 tab, 46 ref.

Descriptors: *Activated sludge, *Respiration, *Denitrification, Investigations, Biochemical oxygen demand, Sludge treatment, Nitrogen, Ammonia, Chemical oxygen demand, Equipment, Sewage bacteria, *Waste water treatment.
Identifiers: *Dehydrogenase activity, *United Kingdom(England).

The respiratory, denitrifying, and dehydrogenase activities of activated sludges from full scale and laboratory scale plants were investigated. The activated sludges were always washed to remove soluble and weakly absorbed substrates. Synthetic sewage was used to facilitate comparison of the estimated potential activities of the sludges. Measurement of carbonaceous metabolic activity, nitrification and denitrification of activated sludges from the various sources made the examination of the interrelationship and dependence on operating variables such as BOD possible. An attempt was also made to account for oxygen uptake and to use the relationship obtained to suggest a means of estimating the quantity of surplus activated sludge produced during treatment. Among the conclusions are these: it is advantageous to operate at low loadings; denitrifying ability tends to fall with decreasing BOD loading; endogenous repiration is a variable and depends upon the history of the sludge; respiration rates support the view that conventional activated sludges are low in viable bacteria; and respiration rate measurements could profitably be included in the examination of activated sludge. (Merritt-FIRL)
W74-10475

COMPUTERISED SEWERAGE SCHEME.
Measurement and Control, Vol 7, No 3, p 83-84, March, 1974.

Descriptors: *Computers, *Sewerage, Treatment facilities, Automatic control, Sewage treatment, Data collections, Water pollution control, Waste water treatment.
Identifiers: *United Kingdom(England).

The computerized sewerage scheme which serves the Borough of Motherwell and Wishaw in Lanarkshire, England is described. It consists of a new main sewage works with a processing capacity of 682,500 cu m/day of raw sewage and two outlying works with capacities of 68,200 cu m/day and 6800 cu m/day. All three works are supervised through a computerized telemetry and control system. The system provides a high degree automatic control for two works each of which are controlled on three push buttons. Without the facilities of the computer based system, 298 push buttons would have been needed for control of the outlying works. A major feature of the control system philosophy is the amount of information processing carried out by the computer. The plant is run on the management by exception principle;

only information about deviations from normal are presented to the operator. The control system will also initially be used in a data gathering mode to amass information about the performance of the plant in a variety of situations. (Merritt-FIRL)
W74-10476

TECHNICAL TOUR FEATURES LULU ISLAND SEWAGE PLANT,
Water and Pollution Control, Vol 112, No 3, p 26-27, March, 1974.

Descriptors: *Treatment facilities, *Sewerage, *Canada, Sewers, Sewage treatment, Biochemical oxygen demand, Suspended solids, Sludge, Pumping plants, Equipment, Dewatering, Sludge treatment, Construction, Operation, Costs, *Waste water treatment.
Identifiers: *Lulu Island(Vancouver-Canada).

The design and operation of the Lulu Island sewage plant of Greater Vancouver, Canada are discussed. The treatment plant serves an area of over 16,000 acres with a system of lateral sewers draining to local pump stations and pumping through shallow force mains to a trunk sewer. The plant was designed for an average dry weather flow of 13.45 mgd in 1980, with provisions for expansion to handle 29 mgd by 2021. The plant was designed to reduce BOD of the sewage by a minimum of 35% and to reduce suspended solids by a minimum of 60%. Primary treatment includes influent sampling, prechlorination, pumping from a subsurface wet well to an above ground screen room housing multiple barminutor units, preaeration and grit removal, sedimentation, sludge removal followed by thickening, dewatering, incineration, and sterile ash disposal. Post chlorination in chlorine contact tanks has a one hour detention time and automatic chlorine residual control. There is provision for sampling and metering of effluent. The plant was also designed to accommodate possible future construction of secondary treatment facilities. (Merritt-FIRL)
W74-10477

DOMESTIC WASH WATER RECLAMATION FOR REUSE AS COMMODE WATER SUPPLY USING A FILTRATION--REVERSE OSMOSIS SEPARATION TECHNIQUE,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
J. B. Hall, Jr., C. E. Batten, and J. R. Wilkins.
Report No NASA TN-D-7600, April, 1974. 34 p, 3 fig, 9 tab, 17 ref.

Descriptors: *Reverse osmosis, *Filtration, *Water reuse, Water supply, Potable water, Phenols, Carbon, Chlorine, Chlorination, Water purification, Sewage bacteria, Investigations, Evaluation, *Waste water treatment, Water conservation, Water pollution, Domestic wastes, Operation, Water quality standards.
Identifiers: *Commode water supply, Methylene blue, Chloroform.

A combined filtration reverse osmosis water recovery system was evaluated to determine its capability to reclaim domestic wash water for reuse as a commode water supply. The system produced water that met all chemical and physical requirements established by the U. S. Public Health Service for drinking water with the exception of carbon chloroform extractables, methylene blue active substances, and phenols. It is thought that this water is of sufficient quality to be reused as commode supply water. The filters were not capable of removing particles less than 1 micron in size from the waste water. The process rate of the reverse osmosis unit was degraded by approximately 46.9% for the 2.7 cu m of filtered wash water processed. Treatment of the process water with 5 ppm chlorine was sufficient to reduce the microorganisms in the commode tank to zero. Efficient dissemination of chlorine was required in order to rapidly inhibit microorganisms in the processed water tank. The use of the combined process for wash water recovery will require a maintenance filter to remove solid materials including those less than 1 micron in size from the wash water. The reverse osmosis module, if sufficiently protected from plugging, is an attractive low energy technique for removing contaminants from domestic wash water. (Merritt-FIRL)
W74-10478

ENHANCED NITRIFICATION BY ADDITION OF CLINOPTILOLITE TO TERTIARY ACTIVATED SLUDGE UNITS,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
R. C. Sims, and L. W. Little.
Environmental Letters, Vol 4, No 1, p 27-34, 1973. 2 fig, 2 tab, 15 ref.

Descriptors: *Nitrification, Water treatment, *Sorption, *Activated sludge, Oxidation, Bacteria, *Zeolites, *Waste water treatment, Tertiary treatment.
Identifiers: *Hector Clinoptilolite.

A new technique for improving the efficiency of the nitrification process in the treatment of wastewater is based on the surface sorption property of a natural zeolite, Hector Clinoptilolite. The process utilizes the zeolite as a solid phase in an activated sludge unit. The zeolite selectively sorbs ammonium ions from wastewater and therefore provides an ideal surface for the attachment of nitrifying bacteria which oxidize ammonium ion to nitrate ion. The removal of the adsorbed ammonium ion from the zeolite by nitrifying bacteria allows regeneration of the zeolite surface and thus enables the same zeolite to be used repeatedly. (Merritt-FIRL)
W74-10479

WATER AND POLITICS IN COASTAL CALIFORNIA - THE DIABLO CANYON EXPERIENCE,
Washington Univ., Seattle. Dept. of Political Science.
K. N. Lee.
Science and Public Affairs, Vol 30, No 2, p 29-35, February, 1974.

Descriptors: Water treatment, *Municipal water, *Desalination, Treatment facilities, *California, Social impact, *Social values, *Nuclear powerplants, *Recycling, *Waste water treatment, Political aspects.
Identifiers: *Diablo Canyon(Calif).

The relationship between public utilities and public opinion is illustrated through a discussion of the Diablo Canyon desalting facility of central California. The primary capacity of the plant would have been the production of fresh water. One of its secondary capacities would have been to use some waste heat from a neighboring nuclear power plant. Less desirably, the desalting plant would have altered the pattern of land use on its small part of the California coast. The plant would have been a strong incentive for population growth and would have provided important engineering and technical benefits in terms of water decontamination and in giving the United States a valuable advantage in international technical assistance. Environmental groups opposed the desalting plant and aroused public opinion to the extent that the voters passed an initiative requiring close scrutiny of future coastline development plans. Eventually, the federal government cancelled the construction of the plant due to budget restrictions and the announcement of construction of a similar plant in Hong Kong that would provide equivalent learning benefits to the engineering community. The project failed because it did not recognize that utilities have social consequences and responsibilities that cannot be ignored. (Merritt-FIRL)
W74-10480

NTA REMOVAL IN SEPTIC TANK AND OXIDATION POND SYSTEMS,
California Univ., Berkeley. Sanitary Engineering Research Lab.
S. A. Klein.
Journal Water Pollution Control Federation, Vol 46, No 1, p 78-88, January, 1974. 11 fig, 2 tab, 12 ref.

Descriptors: Leaching, *Septic tanks, *Biodegradation, *Pilot plants, *Nitrogen compounds, *Oxidation lagoons, *Waste water treatment, *Nitrilotriocetate.
Identifiers: *Leaching fields.

The biodegradability of trisodium nitrilotriacetate (NTA) in pilot scale septic tanks and leaching field systems was investigated to determine its potential as a replacement for phosphate builders in synthetic detergents. The removal of NTA averaged 21.8, 23.3, 23.1 percent in three septic tanks during the nine months of operation. Effluents from the septic tanks flowed into percolation fields contained in a four-compartment box. Five to seven weeks were required for biological slimes to develop and become acclimated to NTA in the fields. In normal aerobic percolation fields all the NTA was essentially degraded from influents containing concentrations up to 60 milligrams/liter. Totally anaerobic fields degraded ten percent NTA, but under nearly anaerobic conditions NTA degradation was virtually 100 percent. The presence of NTA had no noticeable effect on performance of septic tank percolation fields or sewage treatment systems. In aerobic soil columns, NTA was nearly 95 percent degraded from influent concentration of 40 and 100 milligrams/liter. In anaerobic soil columns, degradation ranged from 10-15 percent for the three influent NTA concentrations examined. In oxidation ponds, after a two-month acclimation period, steady state removal of NTA was in excess of 90 percent when influent concentrations were in the range normally expected in wastewater. (Merritt-FIRL)
W74-10481

SEWAGE LIFT STATION GAS TRAP,
R. E. Wilson.
U.S. Patent 3,807,901. Issued April 30, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 5, p 1997, April 30, 1974. 1 fig.

Descriptors: *Patents, *Sewage, Sewers, Effluents, Pressure, Equipment, *Gases, Odor, *Waste treatment.
Identifiers: *Sewer gas, Sewage lift station.

A sewage lift station includes a variable volume breathing assembly which normally isolates the interior of the sewage tank from the surrounding atmosphere and eliminates the escape of offensive gas. The assembly traps the sewer gas in the tank as the effluent level rises and falls between predetermined limits. This effects relatively innocuous venting of a portion of the sewer gas from the tank to the atmosphere if excessive amounts accumulate over a period of time or if an abnormal rise in the effluent level occurs resulting in a rise in the pressure of the trapped gas exceeding ambient atmospheric pressure. (Prague-FIRL)
W74-10483

PROCESS FOR THE TREATMENT OF ACTIVATED SLUDGE,
Komline-Sanderson Engineering Corp., Peapack, N.J.
T. R. Komline, Sr.
U.S. Patent 3,803,806. Issued April 16, 1974. Official Gazette of the U.S. Patent Office. Vol 921, No 3, p 913, April 16, 1974. 1 fig.

Descriptors: *Patents, *Activated sludge, *Sewage sludge, *Waste water treatment, *Gases, Heat.

Hot flue gases containing suspended solid particles, oxygen and other water soluble and insoluble components are injected beneath the surface of sewage sludge. Heat and the above components are transfered from the gases to the sludge, providing oxygen for activating the sludge. (Murphy-FIRL)
W74-10486

PROCESS FOR REGENERATING SPENT ACTIVE CARBON IN A SUSPENSION-DISPERSION TRANSPORT SYSTEM,
FMC Corp., New York.
R. T. Joseph.
U.S. Patent 3,801,514. Issued April 2, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 1, p 306, April 2, 1974. 1 fig.

Descriptors: *Patents, *Activated carbon, Carbon dioxide, Steam, Sewage treatment, Heating, Suspension *Waste water treatment.
Identifiers: *Regeneration, *Suspension-dispersion transport system.

A process for regenerating spent active carbon in a suspension dispersion transport system is described. The carbon, recovered from secondary sewage treatment and from beer and augar refining, is regenerated by rapidly heating it in the dip dispersed phase in the presence of an activating atmosphere. The activating gases are preferably steam or carbon dioxide or both. (Merritt-FIRL)
W74-10487

DEVICE FOR CONTINUOUSLY TREATING LIQUIDS,
Steinmuller (L. and C.) G.m.b.H., Gummersbach (West Germany).
G. Plura.
U.S. Patent 3,802,568. Issued April 9, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 2, p 593, April 9, 1974. 1 fig.

Descriptors: *Patents, *Ion Exchange, Equipment, *Design data, *Waste water treatment.
Identifiers: Germany.

A trisectional device for continuously treating fluids in an ion exchange bed is described. The device consists of a column like hollow body, the ends of which are closed off with lid like elements, distribution elements within the device, supply and discharge conduits for the fluid, the fluid, the fluid treating medium, and tubes within the hollow body and parallel to its longitudinal axis. The free ends of the tubes are firmly connected with intermediate plates. The uppermost tube is provided with cutouts extending all the way through. A smaller tube is concentrically arranged within the uppermost tube and flows into cutouts preferably radially extending through the uppermost tube. In the treating area of the middle bed section the tubes continue as solid rods, again forming tubes in the lower bed section. Cutouts are provided in the connecting region between the solid rod and the lower tube section. (Merritt-FIRL)
W74-10489

WATER PURIFYING DEVICE,
Matsushita Electric Industrial Co., Ltd., Osaka (Japan).
S. Sasaki, and T. Nishikawa.
U.S. Patent 3,802,563. Issued April 9, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 2, p 592, April 9, 1974. 1 fig.

Descriptors: *Patents, *Water purification, *Filters, *Filtration, *Municipal water, Design data, *Valves, Equipment, *Waste water treatment.
Identifiers: Japan.

A water purifying device is described which consists of a filter unit with a filter element within it and a purified water discharge tube connected to it. There is a directional control valve unit with two water outlet ports and an externally operable valve ball. A hose connects one of the water outlet ports with the filter unit. The directional control valve is mounted on a faucet and the valve ball is externally operated to alternately open and close the water outlet ports to obtain purified, city water. (Merritt-FIRL)
W74-10492

PROCESS FOR REMOVAL OF ORGANIC CONTAMINANTS FROM A FLUID STREAM,
AWT Systems, Inc., Wilmington, Del.
G. Sutherland.
U.S. Patent 3,803,033. Issued April 9, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 2, p 704, April 9, 1974. 1 fig.

Descriptors: *Patents, *Organic matter, *Waste water treatment, Iron, Carbon, Dispersion, Adsorption, Filters, *Filtration.
Identifiers: *Magnetic complexes, *Iron-carbon complex.

A process for the removal of organic contaminants from a fluid stream is described. A magnetically susceptible iron carbon complex is dispersed in the stream until a substantial amount of contaminants have been adsorbed from the stream. The dispersion passes through a magnetic filter to separate the dispersion into a fluid stream having a reduced concentration of contaminants and an adsorbed complex containing contaminants. Regeneration of the adsorbed complex may be accomplished by heating the complex in an inert atmosphere at a temperature sufficient to desorb and vaporize the contaminants. (Merritt-FIRL)
W74-10493

SAFETY INSTALLATIONS FOR THE PREVENTION OF POLLUTION THROUGH LEAKAGE IN A PIPELINE,
G. F. Wittgenstein.
U.S. Patent 3,802,456. Issued April 9, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 2, p 563, April 9, 1974. 1 fig.

Descriptors: *Patents, *Pipes, *Pollution abatement, *Engineering structures, Environmental engineering.
Identifiers: *Pipe covers.

A safety installation for protecting the environment from leakages in pipelines comprises a fluid-tight jacket which surrounds the pipeline and forms an intermediate space containing inserts which are separated by ducts sealed with a liquid or gas. The inserts are joined together by cables or wires and there is provided at least one tank towards which the leakage liquid flows through the ducts. A liquid leakage detector acts to remotely control the pumps and valves of the pipeline. The jacket is formed from short rigid runs connected by flexible joints; breaks between the runs contain separation bands and are covered by a flexible fluid-tight structure resting on the inserts and projecting onto the ends of the runs. The length of one run in the curves of the line is proportional to the radius of curvature of the contained pipe. At least one insert is grooved externally, and adjacent longitudinal edges of the jacket are distorted by a tool and then turned down into the groove. Thus, connection between the edges and the groove is fixed position and made fluid-tight by filling the groove with a mass which solidifies on drying. A means is provided to enable the sections of the inserts to deform to a variable extent along the inserts in the curves of the line. These inserts mainly rest on the inner wall of the runs. (Murphy-FIRL)
W74-10494

PROCESS AND APPARATUS FOR THE SEPARATION OF LIQUID MIXTURES,
R. C. Rishel.
U.S. Patent 3,804,252. Issued April 16, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 3, p 1027-1028, April 16, 1974. 1 fig.

Descriptors: *Patents, *Separation techniques, *Specific gravity, *Liquid wastes, Equipment, *Waste water treatment, Oily water.
Identifiers: Gravity separation, Settling.

A process and apparatus for the separation of liquids of different specific gravities are described. A horizontal cylindrical tank is divided into compartments, into one of which the mixture to be separated is introduced, forms distinct layers, and flows over a weir into a second compartment. The heavier, lower layer enters at a point remote from the inlet of the mixture into the first compartment, into a conduit which directs the heavier liquid through a hydraulic trap into a third compartment. The heavier liquid is maintained at a level lower than that of the mixture of the liquids in the initial settling compartment and subsequently removed. (Merritt-FIRL)
W74-10495

SUCCESSFUL APPLICATION OF GRANULAR CARBON SOLVES QUALITY PROBLEMS,
Paris Water Works.
R. Bowling.
Public Works, Vol 104, No 12, p 70-71, December, 1973.

Descriptors: *Water quality, *Filtration, *Kentucky, Treatment methods, Odor, Taste, *Activated carbon, Costs, Waste water treatment.
Identifiers: *Granular carbon.

The successful application of granular carbon in the four filters at the 1.5 mgd water treatment plant at Paris, Kentucky is described. Off taste and odor appeared at Paris irregularly and could last from a day or two to a week or more. Efforts to pinpoint the source of the trouble were never completely successful. The plant had previously used powdered carbon, but switched to granular because the granular appeared to offer a more efficient use of adsorptive capacity of the carbon, decreased need for monitoring the raw water, no capital expenditures requirements and suitable hydraulic characteristics. During a two-week period 50,000 pounds of granular activated carbon were loaded into four filters, each of 275 square feet. The carbon/sand combination of dual media filtration increased the filter capacity. The number of backwashes is less, but the volume of water used is not as low as the frequency would indicate because the filters are washed somewhat longer than before. At 8 and 12 months the measurement of carbon bed depth revealed no measurable loss of carbon due to the backwashing. The minimum life of the carbon is estimated at three years; it costs each of the 9,000 customers a fraction of a cent per day for a dramatic improvement in water quality. (Merritt-FIRL)
W74-10496

DRUG RESISTANT COLIFORMS CALL FOR REVIEW OF WATER QUALITY STANDARDS,
National Inst. for Water Research, Pretoria (South Africa).
W. O. K. Grabow, O. W. Prozesky, and L. S. Smith.
Water Research, Vol 8, No 1, p 1-9, 1974. 1 tab, 126 ref.

Descriptors: Water treatment, *Sewage treatment, Coliforms, Microorganisms, Bacteria, *Water quality, Water pollution, *Water pollution control, *Waste water treatment, Escherichia coli, Water quality standards.

The need for a reevaluation of the role of coliforms in water quality is discussed. The therapeutic value of antimicrobial drugs is diminishing due to the rapid increase of resistant bacteria. A current prominent type of resistance is

mediated by R factors (extrachromosomal nucleic acid elements) which may cause high level resistance to other antibacterial agents such as ultraviolet light, heavy metals, bacteriocins, and phages, and may enhance the virulence and infectivity of pathogens. Intestinal Gram-negative bacteria like coliforms may act as reservoirs of R factors and transfer them to pathogens. Evidence is presented that sewage-polluted water may play an important role in the spread of coliform and other bacteria-carrying R factors. Since coliforms have joined forces with bacteria increasingly involved in disease, they can no longer be regarded as harmless indicators of fecal pollution. This calls for reevaluation of water quality standards and for more advanced purification of sewage prior to discharge into the environment. (Merritt-FIRL)
W74-10497

A CHLORINE DEMAND STUDY OF SECONDARY SEWAGE EFFLUENTS,
Illinois State Water Survey, Peoria. Water Quality Section.
S. Lin, and R. L. Evans.
Water and Sewage Works, Vol 121, No 1, p 35-44, January, 1974. 1 fig, 4 tab, 10 ref.

Descriptors: *Sewage treatment, *Chlorination, Mathematical studies, Municipal wastes, Chlorine, *Waste water treatment.
Identifiers: Chlorine demand, Calcium hypochlorite.

Samples of sewage effluent from three types of secondary sewage treatment were chlorinated with calcium hypochlorite and chlorine water at dosages through 12 milligrams/liter chlorine. Chlorine demands were ascertained by periodic determinations of residual chlorine during a time span of 60 minutes. The chlorine demands were observed to be influenced by the initial dosage, contact time, and the source of chlorine. In general, the higher the dosage, the greater the demand. The demand of the sewage effluents was consistently less when using calcium hypochlorite compared to chlorine water. The demands also varied from run to run and with the types of sewage treatment. Two geometric expressions, one for contact times of 1-12 minutes, and the other for times of 12-60 minutes, were useful for predicting the chlorine demands of domestic sewage. These expressions utilize the weight ratio of the chlorine dosage and the ammonia-N concentration of the sewage effluents. (Meritt-FIRL)
W74-10498

PALM BEACH COUNTY SEWAGE IMPROVEMENT PROGRAM FLORIDA (FINAL ENVIRONMENTAL STATEMENT).
Environmental Protection Agency, Atlanta, Ga.
Available from Nat Tech Info Serv, Springfield, Va 22161, as EIS-FL-72-5809-F-1. December 20, 1972. 434 p, 13 map, 16 tab, 3 illus, 11 chart.

Descriptors: *Florida, *Environmental effects, *Waste water treatment, Government finance, Oceans, *Water pollution, Lakes, Outfall sewers, Sewage, Municipal wastes, Environmental sanitation, Sewage treatment, Costs, Ocean circulation, Coasts, Interceptor sewers, Federal Water Pollution Control Act.
Identifiers: *Environmental impact statements, *Palm Beach Co(Fla).

The proposal consists of federal assistance under the Federal Water Pollution Control Act to aid in construction of a regional wastewater treatment plant for the city of West Palm Beach, Florida. The initial project will consist of a 16 million gallon per day secondary treatment facility using the extended air modification of activated sludge. A decision on the grant is deferred pending the results of negotiations between Palm Beach and West Palm Beach. The beneficial results of the project would be to remove a source of inadequately treated wastewater from Lake Worth and provide adequate treatment for the disposal method selected. The adverse results include committing land for treatment plant site and clearing a right-of-way for a transmission line from the existing treatment plant to the new site. Other alternatives were: no action; advanced waste treatment such as nitrogen, phosphorus or activated carbon; and sludge disposal by landfill, ocean disposal or incineration. (Conko-Florida)
W74-10514

ACTIVATED SLUDGE - BIO-DISC TREATMENT OF DISTILLERY WASTEWATER,
American Distilling Co., Pekin, Ill.
J. L. Thomas, and L. G. Koehrsen.
Available from GPO Sup Doc EP1.23:660/2-74-014, $1.40; microfiche from NTIS, Springfield, Va 22161 as PB-234 383, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-014, April 1974. 92 p, 10 fig, 20 tab, append. EPA Project 12060 FLL. Program Element 1BB037.

Descriptors: *Activated sludge, *Industrial wastes, *Waste identification, *Design criteria, Biological treatment, Evaluation, *Waste water treatment, Cost comparisons, Aeration, Pilot plants.
Identifiers: *Distillery wastes, *Rotating biological contactor, Aeration clarification.

Plant scale evaluation of activated sludge and Bio-Disc treatement of distillery wastewater has been conducted over a period of more than one year at Pekin, Illinois. The activated sludge process consistently provided in excess of 90 percent removal of BOD5, even at loadings greater than the treatment plant design levels. The Bio-Disc process had to be down-rated from the original design basis in order to approach a comparable removal efficiency. Of the two systems evaluated, the activated sludge process was the more desirable from standpoints of economics, treatment performance, and ability to handle shock loads. (EPA)
W74-10525

A PREDICTIVE MODEL FOR SLUDGE CHARACTERIZATION USEFUL TO DESIGN AND CONTROL OF SLUDGE DEWATERING PROCESSES IN WATER RECYCLE SYSTEMS,
Maine Univ., Orono. Dept. of Chemical Engineering.
E. G. Bobalek, R. E. Durst, and B. Yadeta.
Available from the National Technical Information Service as PB-233 205, $4.50 in paper copy, $1.45 in microfiche. Environmental Studies Center, Completion Report No 1-74, July 1973. 110 p, 22 fig, 10 tab, 37 ref. OWRR B-008-ME(1).

Descriptors: *Bound water, *Filtration, *Model studies, Slurries, Filters, Industrial wastes, Municipal wastes, *Sludge, *Dewatering, *Water reuse, Fluid mechanics, *Recycling, *Waste water treatment.

An empirical correlation was developed relating the filterability of synthetic slurries to the hydrophilic character of the resulting filter cakes and the filtration driving force. The hydrophilic character was evaluated by determining the bound water corresponding to 99% saturation of the filter cake samples as indicated by the vapor pressure at a fixed temperature, while the driving force was provided by a differential pressure system. The experimental data were correlated using dimensionless variables and the results indicated that at a fixed bound water the dependence of filterability on the driving force group was almost linear, while at a constant driving force a one cycle change in bound water resulted in a two cycle change in the filterability. It is concluded that the filterability of synthetic slurries correlates inversely with the hydrophilic character of resultant filter cakes, where such a characteristic is defined and measured as the equilibrium bound water in the filter cakes at a standardized temperature. No single mechanism of water binding is sufficient to account for the total bound water in colloid modified solid liquid systems. The relationship between bound water and filterability is a proper index of filterability independent of slurry composition. (Merritt-FIRL)
W74-10528

STATE OF MARYLAND WASTE OIL RECOVERY AND REUSE PROGRAM,
Environmental Quality Systems, Inc., Rockville, Md.
E. J. Martin, and G. D. Gumtz.
Copy Available from GPO Sup Doc as EP1.23:670/2-74-013, $2.70; microfiche from NTIS, Springfield, Va 22161 as PB-234 446, $2.25. U.S. Environmental Protection Agency, Office of R and D. Environmental Protection Agency, Technology Series Report EPA 670/2-74-013, January 1974. 248 p, 10 fig, 93 tab, 51 ref. EPA Program Element IBB041. S800650.

Descriptors: *Oil wastes, *Maryland, *Management, *Planning, *Control, Recycling, Surveys, Regions, Economics, Waste treatment, Waste disposal, Industrial wastes, Cost analysis, Design data, Oil spills.
Identifiers: *Waste oil recovery, Waste crankcase oil, Waste lube oil, Waste oil collection, Waste oil re-refining, Waste industrial oils, Implementation plan, Recovery and reuse.

This report supplements the findings of a 1971 study conducted by the Maryland Environmental Service and the Department of Health and Mental Hygiene, which concluded that the discharge of waste oils to state waters produced a problem within the State of Maryland. The report recommended a comprehensive program of collection, storage, and reprocessing for pollution prevention and for resource recovery. The program was guided by the premises that all categories of waste oils generated within the State were to be managed, recovered, or disposed of, that fuel oils would be the principal products produced, and that current state-of-the-art technology would be used in the design of the program elements. Using questionnaires and interviews, it was estimated that 18.5 million gallons of waste oils were generated in Maryland in 1972. Mathematical models determined the most effective collection systems and economics for the waste oil program. Preliminary designs were developed for different scales of process plants. Heavy emphasis was placed on protecting the environment. Plant costs varied between $3 million for a 7.3 million gallon per year (mgy) plant, to $7.5 million for a 30 mgy plant. Management, legislative and regulatory approaches to the waste oil problem were also delineated. A waste oil recovery and reuse program can be initiated immediately using existing technology, collection and storage resources. Because of a need to consider all sources of waste oils, the program requires subsidization at lower plant throughputs. At the 30 mgy capacity, the program economics can be self-sustaining. (EPA)
W74-10539

FINAL REPORT--DEEPWATER PILOT PLANT TREATABILITY STUDY.
Delaware River Basin Commission, Trenton, N.J.
Copy Available from GPO Sup Doc as EP1.23:660/2-73-038, $4.10; microfiche from NTIS, Springfield, Va 22161 as PB-234 441, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-73-038, March 1974. 417 p, 165 fig, 60 tab, 4 ref, append. Program Element IBB036. EPA Project 11060-DRO.

Descriptors: *Pilot plants, *Activated sludge, Regional analysis, Aerobic digestion, Filtration, Activated carbon, Organic loading, *Delaware River Basin Commission, *New Jersey, *Waste water treatment, Pre-treatment(Water), Neutralization.
Identifiers: *Joint industrial-municipal treatment, *Regional wastewater treatment, Vacuum filtration, Clarification, Filter pressing.

The Delaware River Basin Commission initiated a study of a joint industrial-municipal regional wastewater collection and treatment system for southern New Jersey. Staff personnel determined an optimum collection area for ten industrial plants and inclusive municipalities. Engineering-Science, Inc., Washington, D.C. was selected as design and operating engineers of a 50 gpm pilot plant to treat a composite of refinery, petrochemical, and municipal wastewater. Raw wastewater was subjected to the following processes: pretreatment, equalization, neutralization, primary clarification, varied types of activated sludge, final clarification, and intermittent varied testing on polishing and disinfection. The activated sludge process, at optimum conditions, removed 90 percent of the BOD of the strong predominately industrial waste. The raw wastewater color ranged from 200 to 1800 units color which was readily removed by carbon sorption of the activated sludge effluent. Aerobic digestion reduced excess activated sludge volatile suspended solids 50 percent in 20 days. Either vacuum filtration or filter pressing would be most applicable for dewatering. Pilot plant operation confirmed treatability proposals, developed design criteria and pointed out areas of additional study. (EPA)
W74-10540

ANAEROBIC - AEROBIC PONDS FOR BEET SUGAR WASTE TREATMENT,
Beet Sugar Development Foundation, Fort Collins, Colo.
W. J. Oswald, R. A. Tsugita, C. G. Golueke, and R. C. Cooper.
Copy available from GPO Sup Doc as EP1.23/2:73-025, $2.10; microfiche from NTIS, Springfield, Va 22161 as PB-227 343, $2.25. Environmental Protection Agency, Technology Series Report EPA-R2-73-025, February 1973. 153 p, 42 fig, 11 tab, 13 ref, 8 append. EPA Grant No. WPD-93-03;93-04.

Descriptors: *Waste water treatment, Water quality control, Pollution abatement, Industrial wastes, Pilot plants, Treatment facilities, Sugar beets, *Biochemical oxygen demand, Oxidation lagoons, Aerated lagoons, Aerobic conditions, Anaerobic conditions.
Identifiers: *Sugarbeet waste treatment, *Anaerobic ponds, *Facultative ponds, *Aerobic ponds, Algal growth, Nutrient addition, Odor control.

Sugarbeet factory transport (flume) water wastes were treated in pilot-sized anaerobic, facultative and aerobic ponds to remove BOD. Physical, chemical and mechanical data were collected on the performance of each pond which showed cause for abandoning the facultative phase of treating. BOD removal in the anaerobic pond was a linear function of the BOD loading and up to a loading of 2,000 pounds of BOD per acre per day, 80% removal was accomplished with the assistance of mechanical aeration. The algae (aerobic) pond was mixed by means of four 12,000 gpm propeller pumps. Some unseparated algae pond effluent was recycled to the anaerobic pond proving organic nitrogen, phosphorus and 'seed' for the microbial transformations. Additional nutrients were required for maximum performance. The system was effective in converting soluble BOD to insoluble BOD. The report indicates potential commercial application of certain segments of the process investigated. (EPA)
W74-10542

TREATMENT AND RECOVERY OF FLUORIDE INDUSTRIAL WASTES,
Grumman Aerospace Corp., Bethpage, N.Y.
C. J. Staebler, Jr.
Copy Available from GPO Sup Doc as EP1.23:660/2-73-024, $1.40; microfiche from NTIS, Springfield, Va 22161 as PB-234 447, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-73-024, March 1974. 85 p, 23 fig, 20 tab, 16 ref, append. EPA Project S800680(12070 HGH). Program Element IBB036.

Descriptors: Lime, *Ion exchange, Calcium, Sludge, *Fluorides, *Waste water treatment, *Industrial wastes, Separation techniques, Pilot plants, Water reuse, Centrifugation, Chemical precipitation.
Identifiers: *Fluoride industrial wastes, *Lime treatment, Recovery(Wastes).

The development and successful demonstration of laboratory and pilot-scale fluoride treatment techniques for selected aerospace and metal working industry chemical processing solutions and rinse waters are described. Included are laboratory-scale, lime treatment parameters for chemical processing solutions such as temperature, retention time, pH, slurry concentration and fluoride influent and effluent levels, and ion-exchange treatment to reduce the fluoride concentration of rinse waters to levels less than three parts per million. Pilot studies of centrifugal techniques to separate lime-precipitated bridges from titanium chemical milling, titanium descaling and aluminum deoxidizing solutions show that lime precipitation can give final effluents having fluoride concentrations less than three parts per million. Aluminum conversion coating solutions, however, require secondary treatment with aluminum sulfate to give final effluents have fluoride concentrations less than three parts per million. Chemical and mechanical property tests show that is is potentially feasible to use calcium fluoride sludge as a strength-maintaining additive for concrete. The reuse of treated rinse waters, the economics of precipitation, and production plans for chemical processing solutions and rinse waters are also presented. (EPA)
W74-10543

IMPROVEMENT OF TREATMENT OF FOOD INDUSTRY WASTE,
RAI Research Corp., Long Island City, N.Y.
S. B. Tuwiner.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-035, $1.25; microfiche from NTIS, Springfield, Va 22161 as PB-234 444, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-035, May 1974. 73 p, 31 fig, 4 tab, 30 ref. EPA Project 12060 ESY, Program Element IBB037.

Descriptors: *Dairy industry, *By-products, Electrolysis, *Oxidation, Froth flotation, Activated carbon, Adsorption, *Waste water treatment, Chemical oxygen demand.
Identifiers: *Cheese whey, *Protein recovery, *Electrolytic oxidation, Agitation, *Chemical oxygen demand reduction.

Laboratory studies were conducted to determine the feasibility of reducing the COD demand of cheese whey waste generated from dairy processing plants. Three primary processing variables were studied; agitation, temperature and current density. Results indicate electrolytic oxidation efficiency was best at 70C, agitation at 9.6 feet per second and a current density of 9.5 amperes per square foot (equivalent to 6 amperes in the test cell investigated). Concentration of 60 percent of the whey protein was also possible by collection of the froth produced during electrolysis. This mechanism of COD reduction could afford recoverable protein from the whey. Carbon adsorption of the electrolyzed whey was also shown to be extremely effective in reducing the COD. The carbohydrates after oxidation to carboxylic acids are very readily adsorbed, the carbon loading being in excess of that expected for secondary effluents. The feasibility of combining the electrolytic oxidation with froth collection and carbon adsorption is proposed as a possible attractive procedure for recovery of values from the whey. (Boydston-EPA)
W74-10544

WASTEWATER ABATEMENT IN CANNING VEGETABLES BY IQB BLANCHING,
Wisconsin Univ., Madison. Dept. of Food Science.
D. B. Lund.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-006, $1.25; microfiche from NTIS, Springfield, Va 22161 as PB-234 495, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-006, April 1974. 78 p, 29 tab, 12 ref, append. EPA Program Element IBB037. Grant No. S-801484.

Descriptors: *Pollution abatement, Water pollution, Canneries, Vegetable crops, *Industrial wastes, Pre-treatment(Water), *Waste water treatment.
Identifiers: *Blanching(Vegetables), *Cannery wastes, *Vegetable processing wastes, Individual quick blanching.

A study on the efficacy of a new blanching system, Individual Quick Blanch (IQB), as applied to vegetables prior to canning was conducted. Peas, corn, lima beans, green beans, potatoes, carrots and beets were adequately blanched by IQB. Compared to deep bed steam blanching or pipe blanching, IQB generally resulted in a significant reduction in effluent. Slight drying of the vegetables before IQB reduced effluent even more; however, product quality was adversely affected in most cases. It was demonstrated that the IQB process can significantly reduce effluent volume and BOD generation in the blanching operation while adequately fulfilling the objectives of blanching. Recommendations for commercial development of IQB are given. (EPA)
W74-10545

TERTIARY PHOSPHORUS REMOVAL AND LIMITING NUTRIENT STUDIES AT C.F.S. LAC ST. DENIS,
Environmental Protection Service, Burlington (Ontario). Wastewater Technology Centre.
E. E. Shannon, and J. M. Salvo.
Environment Canada Water Pollution Control Directorate Report No. EPS 4-WP-74-1, February 1974. 60 p, 16 fig, 16 tab, 24 ref.

Descriptors: *Waste water treatment, *Pilot plants, *Oxidation lagoons, Chemical treatment, Coagulation, Flocculation, Filtration, Algae, Nutrients, Growth rates, Effluents, Filters, *Phosphorus, Zinc, Lead, Iron, Nitrogen, Coliforms, Eutrophication, Operating costs, *Canada, *Tertiary treatment.
Identifiers: Alum, Backwash, *C.F.S. Lac St. Denis(Canada).

Pilot plant experiments on the treatment of the stabilization pond effluent from Canadian Forestry Services Lac St. Denis are described. The plant was a 10 Igpm chemical treatment system consisting of chemical coagulation, flocculation, tube settling, and mixed media filtration components. Various alum and polymer feed conditions were evaluated over the 10 mo period of continuous operation. Algal assays were carried out on the receiving water, Lac Depatie, to determine the limiting nutrient and to ascertain the effect of treated and untreated pond effluent upon algal growth. Because of seasonal variations in the quality of the stabilization pond effluent, it was observed that the recommended summer alum dosage level of 100 mg/l must be increased to 1[illegible] mg/l to achieve equivalent phosphorus removal. Filter backwash requirements and backwash sludge production and characteristics were determined. For several chemical feed conditions the pilot plant demonstrated a limited capability for zinc, lead, iron, and nitrogen removal and a high efficiency for coliform removal. Phosphorus was the probable limiting nutrient in Lac Depatie and the planned efforts to reduce phosphorus loading to the lake from C.F.S. Lac St. Denis should significantly reduce the present eutrophic condition. Chemical operating costs are estimated at [illegible] cents/1000 I gal. (Merritt-FIRL)

W74-10551

BIOLOGICAL TREATMENT OF AIRPORT WASTEWATER CONTAINING AIRCRAFT DE-ICING FLUIDS,
Environmental Protection Service, Burlington (Ontario). Wastewater Technology Centre.
B. E. Jank, H. M. Guo, and V. W. Cairns.
Environment Canada Water Pollution Control Directorate Report No EPS-4-WP-73-5, July 1973. 113 p, 26 fig, 43 tab, 7 ref, 2 append.

Descriptors: *Biological treatment, *Waste water treatment, *Deicers, *Activated sludge, Pilot plants, Air temperature, *Canada, Design criteria, Bioassay, Rainbow trout, Toxicity, Domestic wastes, Biochemical oxygen demand, Suspended solids, Microorganisms, Organic wastes, Effluents, Aeration, Equipment, Nutrients, Oxidation.

The feasibility of treating a combination of de-icing fluids and airport waste water using an activated sludge process was investigated to provide information for the design of treatment facilities at the new airport at St. Scholastique, Quebec, and for assessing alternatives at other airports across Canada. The first part of the study was a bench scale activated sludge study to determine the optimum loading condition and to obtain design parameters for the treatment of de-icing fluids and municipal sewage at low temperatures. A 131 cu m/day Igpm pilot plant was operated at the optimum organic loading to verify the results from the laboratory scale study and determine whether there were any operational problems. The second part of the program, bioassay studies, was carried out to determine whether the aircraft de-icing fluids and process effluents were acutely toxic to rainbow trout. The results show that an activated sludge system treating a combination of de-icing fluid and domestic sewage at less than 10C produces an effluent have BOD and suspended solids concentrations not exceeding 20 mg/liter and 25 mg/liter respectively at a loading of 0.15 kg BOD/kg MLSS/day. Growth of filamentous microorganisms and the resulting bulking condition were responsible for the low loading condition. (Merritt-FIRL)
W74-10552

PROCESS DESIGN AND OPERATION FOR ZERO EFFLUENT DISCHARGE,
Environmental Science and Engineering, Inc., Gainesville, Fla.
E. R. Hendrickson, and H. S. Oglesby.
Tappi (Technical Association of the Pulp and Paper Industry), Vol 57, No 4, p 71-73, April 1974. 8 ref.

Descriptors: *Federal Water Pollution Control Act, *Water pollution, *Effluents, Water reuse, Water treatment, Industrial wastes, Legislation, Washing, Bleaching wastes, Screening, Dilution, Chemicals, *Waste water treatment.
Identifiers: *Zero effluent discharge, Water reclamation, Amendments to Federal Water Pollution Control Act, 1972, Pulp washing efficiency.

The Federal Water Pollution Control Act Amendments of 1972 declared the national goal to be that the discharge of pollutants into navigable waters be eliminated by 1985. This is commonly referred to as 'zero effluent discharge.' A kraft mill, for example, will require a combination of reduction of waste water generation, maximizing reuse of waste water streams, and development and application of unique new treatment techniques. Among the process measures which look promising to reduce waste water discharges are: increasing pulp washing efficiency, closing brown stock screening, oxygen or other bleaching, increasing dilution in washing, stripping condensates, collecting chemical spills, collecting fiber spills, and dry barking. It may be possible to maximize reuse of waste water streams and recover the chemicals. Most of these techniques are in the early development stages and some consist only of isolated unit processes. (Prague-FIRL)
W74-10554

(CITY OF SUDBURY, ONTARIO, CANADA).
Water and Pollution Control, Vol 112, No 3, p 32, March 1974.

Descriptors: *Sludge disposal, Treatment facilities, Sewage, *Sludge treatment, Sludge, Investigations, Organic wastes, Oxidation, Limestones, *Canada, *Waste water treatment.
Identifiers: *Sudbury(Ontario-Canada).

The City of Sudbury, the Ontario Environment Ministry, and the International Nickle Co. of Canada, Ltd. are currently experimenting together for a means of disposing of digested sewage sludge from the city's new water pollution control plant. The plant's waste is being dumped onto INCO's tailings disposal area. About 150,000 gallons of sludge have been dumped each week on test plots. This is equivalent to 1800 cu yd of sludge spread monthly by trucks working 5 days a wk. The test plots include both vegetated and nonvegetated areas to enable collecting data on a controlled basis. The plot sizes vary, but together encompass approximately 50 acres. The experiment will evaluate different types of vegetation which may or may not produce second generation growth mutations. The organic waste oxidizes slowly and releases nutrients in addition to acting as a pH control. Limestone is the principal additive reaching the tailings area. Natural composition is mainly silica, iron and those minerals found in granite rock. The average depth of sludge penetration into the tailings has yet to be assessed. There is still uncertainty as to the benefits which the sludge will contribute. (Merritt-FIRL)
W74-10555

SUBMERGED AERATORS ARE HOT,
Philadelphia Mixers Corp., King of Prussia, Pa.
R. L. Winter.
Water and Wastes Engineering, Vol 11, No 3, p 37-38, 69, March 1974.

Descriptors: *Waste water treatment, *Aeration, *Waste water disposal, Underground structures, Costs, Flexibility, Mixing, Oxygenation, Basins.
Identifiers: *Aerators(Submerged).

The advantages and applications of submerged turbine aerators are described. The systems are particularly economical to use where land costs are relatively high because they can provide higher intensities than surface aerators. The aerators offer flexibility for changing the performance characteristics of the installation. A submerged unit can be easily modified to generate and distribute a larger volume of air than originally designed for. The basins take up considerably less space than surface aerators and they are highly effective in dispersing oxygen through the aeration basin. Their oxygen utilization is at least 20% which is four times as high as the diffused air types. The submerged systems are highly efficient due to the combination of pressured diffusion with that of mechanical mixing, the saturation level of the liquid being mixed, and the compact design of the basins. (Merritt-FIRL)
W74-10557

FORGING THE MISSING LINK,
For primary bibliographic entry see Field 5C.
W74-10558

AN EXPERIMENT ON DISPOSAL OF METAL WORKING OIL EMULSION INTO SEWER SYSTEMS (KINZOKU KAKOYU NO HAISUI SHORI NI KANSURU ICHI JIKKEN),
Kao Soap Co., Tokyo (Japan). Industrial Research Labs.
K. Izumi, and H. Nagamori.
Junkatsu (Journal of the Japanese Society of Lubrication Engineers), Vol 19, No 3, p 32-40, March 1974. 6 fig, 4 tab, 12 ref.

Descriptors: *Waste disposal, *Oil, *Emulsions, Sewerage, *Industrial wastes, Equipment, Electrodes, Anodes, *Oxidation, Corrosion control, Flow rates, Organic matter, *Waste water treatment.
Identifiers: Japan, Platinum, Ruthenium.

An anode oxidation procedure for the disposal of metal working oil emulsion into sewer systems was developed to decompose emulsifiers followed by short time settling to separate the oil from the water. The procedure can be used in laboratories or in machine shops of small size where small quantities of emulsions need to be disposed of and where independent sewer systems of large capacity cannot be justified. A platinum (and/or ruthenium) plated sintered glass filter was used to make the equipment compact and to reduce man power to replace the anode due to corrosion. There was a 95% removal of organic matter from the drainage water although the flow rate of the emulsion was too low to be practical. Changing the shape and the structure of the electrodes will probably increase the flow rate. (Merritt-FIRL)
W74-10559

STUDY OF CARBOHYDRATE SOLUBILIZATION FROM SEWAGE SLUDGES,
Holywell R. D. C. (Wales).
S. G. H. Owen, and R. Lamb.
Water Pollution Control, Vol 78, No 1, p 114-120, 1974. 8 fig, 17 ref.

Descriptors: *Carbohydrates, *Sewage sludge, *Solubility, *Sludge treatment, Mixing, Hydrogen ion concentration, Age, Liquid wastes, *Solids contact processes, *Waste treatment, Dilution, Organic compounds.

Carbohydrate solubilization from sewage sludges was investigated to examine: the degree of solubilization of carbohydrates occurring from the sludge to the sewage liquid; the changes in carbohydrate concentration in the liquid isolated from the sludge; and some of the factors which may influence these processes. Although dilution was important, there was a tendency for the same concentration of carbohydrates to dissolve into the liquid no matter what the dilution. The time of contact between the liquid and the sludge was important, with more carbohydrates solubilizing out into the liquid the longer the time of contact, at least up to the 18th day, if the sludge and liquid were not mixed. Mixing of the sludge and liquid was important, although after an initial large increase in concentration within the first day, the rate and pattern of solubilization in a mixed sample was similar to that in the unmixed sample. The age of the sludge affected the quantity of carbohydrates dissolving into the liquid; the fresher the sludge, the greater the amount of solubilization. Temperature had little effect on the process, although a low temperature of 2C tended to slow down the process. The initial pH of the system was not important. There was a 50% reduction in carbohydrate concentration if the sludge liquid was kept out of contact with the sludge for one day. (Merritt-FIRL)
W74-10562

ASH-HANDLING SYSTEM ELIMINATES RUNOFF POLLUTION.
For primary bibliographic entry see Field 5G.
W74-10564

WATER TREATMENT CHEMICALS.
Indian Chemical Journal, Vol 8, No 6, p 40, December 1973.

Descriptors: *Water treatment, *Chemicals, Organic acids, Polymers, Boilers, Recirculated water, Corrosion control, Water cooling, Sludge.

Identifiers: United Kingdom, India, Carboxylic acid.

A new range of water treatment chemicals, called the Belgard 800 range has been introduced by the Industrial Chemicals division of Ciba-Geigy (UK) Ltd. All, except Belgard 880 and 881, are based on a low molecular weight polymeric carboxylic acid. There are seven chemicals in the range, two for boiler treatment applications and five for use in water recirculation systems. Of the latter five, types 880 and 861 are for use as scale control additives and act as threshold and crystal distortion agents, giving a physical as well as chemical action; types 881 and 883 are corrosion inhibitors without the inherent disadvantages of chromates or polyphosphates; and type 880 is a pretreatment formulation designed to passivate the water wetting surface of cooling systems, and give rapid conditioning of the system prior to its treatment with Belgard 881. The two chemicals for steam raising boilers, types 850 and 851, were developed to deal with problems arising from the deposition of hardness scale and sludge in the feed system and the boiler. All seven grades meet the modern day requirements of industry, such as ease of application, reliability and economy, and extend the inservice operation of the plant and reduce downtime for cleaning. (Merritt-FIRL)
W74-10565

THE DESIGN AND OPERATION OF ACTIVATED SLUDGE FINAL SETTLING TANKS,
Satec Ltd., Crewe (England).
R. L. Hibberd, and W. F. Jones.
Water Pollution Control, Vol 78, No 1, p 14-32, 1974. 13 fig, 9 tab, 11 ref.

Descriptors: *Activated sludge, *Settling basins, Evaluation, *Design, Operation, Analysis, Effluents, Anaerobic conditions, Laboratory tests, Flow, *Suspended solids, *Sludge treatment, *Waste water treatment.

The design and operation of activated sludge final settling tanks were investigated in laboratory studies. Three aspects of the tank operation are important: the production of a clarified effluent under all flow and sludge conditions; the return of a concentrated underflow to maintain mixed liquor suspended solids (MLSS) concentrations, and the prevention of excessive solids retention periods under anaerobic conditions. The theoretical analysis of sludge thickening overestimates the solids handling capacity of the final tank. The error in the prediction can be related to sludge bed depth and return sludge rate by conducting laboratory continuous tests. The extent to which the laboratory results can be applied to full scale tank performance depends upon the degree of flocculation obtain in the tank and the uniformity of flow distribution over the plan area. A tank design approach to maintain clarification at all flow conditions is suggested. This is based on providing sufficient capacity for dry weather flow loading with shallow bed depths in the tanks, and ensuring that an excessive increase in bed depth does not occur during high flows. The criteria derived will vary with the aeration unit size and the MLSS concentration required, and assumes that a low bed depth will be maintained under low flow conditions. (Merritt-FIRL)
W74-10573

SEWERAGE SYSTEMS DESIGN.
Computer Aided Design, Vol 6, No 1, p 54-55, January, 1974.

Descriptors: *Computers, *Sewerage, Data storage and retrieval, Data processing, Documentation, Optimization, *Hydraulic design, Pipes, *Automation, Estimating, Data collections, *Design criteria, *Control systems.

An integrated computer-based system for the design of sewerage systems and for the automatic production by computer of drawings and contract documents has been developed by General and Engineering Computer Services, Ltd., Liverpool, England. The programs are totally interlinked which reduces to a minimum the manual production of information, yet permits the engineer to intervene at all stages of the design process to overwrite and to amend the computerized design. There are seven individual program modules: master file creation and control programs; optimization; hydraulic calculations; pipe strength and class of bedding; automatic drawings; estimates and K29 form; and bill of quantities. (Merritt-FIRL)
W74-10575

SEWAGE DISPOSAL SYSTEM,
Aerobiotic Sciences Inc., Jersey City, N.J.
W. C. Langston, and D. W. Smith.
U S Patent No 3,807,565, 4 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 1910, April 30, 1974.

Descriptors: *Patents, *Sewage treatment, *Aerobic treatment, *Filtration, *Wastewater treatment, Pollution abatement, Water quality control, Water pollution control, Aeration, *Sewage disposal.
Identifiers: Aerators, Activated charcoal.

An Aerobiotic sewage disposal system includes a primary comminution or break up chamber in which gross incoming solids are broken up and partially oxidized as they pass within a fiberglass cone. The bottom of this conical hopper has a circular aerator positioned so as to provide only a thin annular passage so that only minute solid particles may escape the cone compartment after being reduced in size through aerobic action. The secondary treatment is strained through a filter placed around the conical hopper so that, by aerobic action, the biological filtering can be completed. This filter bag is formed of a 'sandwich' of polyester deep pile inner lining with a center of activated charcoal and an outer polyester cloth. The second aerator is placed around the bottom surface of the unit, with the bottom wall of the unit being convex so that minute suspended solids which may pass through the filter bag, would tend to settle around the bottom edge of the unit, and would be agitated by the aerator which is in the lowermost corners of the unit and prevents any accumulation of sludge. A third filter is provided for completing filtration with a weir pick up being provided for collecting the effluent. (Sinha-OEIS)
W74-10577

WEAKLY OXIDIZING ORGANIC SUBSTANCES IN WASTE WATERS AND THE PROBLEM OF SANITARY PROTECTION OF WATER BODIES, (IN RUSSIAN),
Meditsinskii Institut, Irkutsk (USSR). Dept. of General Hygiene.
Ya. M. Grushko.
Gig Sanit. Vol 37, No 7, p 80-83. 1972.
Identifiers: *Aeration, *Incineration, *Organic matter, *Ozonization, Sanitary protection, *Waste water treatment.

Techniques adopted for the treatment of waste waters with poorly oxidizable organic matter in various countries are reviewed. Possible methods include aeration, ozonization and incineration.--Copyright 1973, Biological Abstracts, Inc.
W74-10582

FLOATING SOLIDS RETURN DEVICE,
Oldham (Robert R.) Inc., Sidney, Ohio.
R. R. Oldham, and J. H. Wooddell.
U S Patent No 3,805,957, 4 p, 2 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 921, No 4, p 1483, April 23, 1974.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, Pollution abatement, *Liquid wastes, Water quality control, Water pollution control, Equipment, Separation techniques, Aerators, Effluent, Settling basins.
Identifiers: *Settling tanks.

A sewage treatment system in which liquid sewage containing solids is conducted into first or primary settling tank is disclosed. Liquid is drawn from an intermediate depth of the first tank and conducted to a reducing tank containing means for inducing air (aerator) into the fluid. A final or outflow settling tank adjacent the reducing tank includes a wall in common with the reducing tank under which settled solids are conducted from the outflow tank to the reducing tank. A floating solids return is also provided between the outflow and reducing tanks, and includes a provision for closing off the fluid flow path from the reducing tank to the output tank when the aerator is not operating to prevent the surface fluid of the reducing tank from flowing into the outflow settling tank. The effluent is drawn from an intermediate depth of the outflow settling tank. (Sinha-OEIS)
W74-10583

PROCESS FOR TREATING WASTE WATER FROM INDUSTRIAL PROCESSES,
Deutsche Texaco A.G., Hamburg (Germany). (assignee)
E. Ruschenburg.
U S Patent No 3,804,757, 3 p, 1 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 1149, April 16, 1974.

Descriptors: *Patents, *Industrial wastes, *Waste water treatment, Water pollution control, Water quality control, Pollution abatement, Hydrogen sulfide, Ammonia, Phenols, *Chemical wastes, *Separation techniques.
Identifiers: Ammonium sulfate, *Chemical treatment.

A process for separating hydrogen sulfide, ammonia and phenolic compounds from waste water comprises: (a) stripping the hydrogen sulfide and ammonia from the waste water, (b) treating the stripped hydrogen sulfide and ammonia with sulfuric acid to form ammonium sulfate and release hydrogen sulfide, (c) removing the freed hydrogen sulfide, and (d) mixing a portion of the ammonium sulfate solution from (b) with an aqueous caustic solution of phenolic compounds in a vessel causing the phase separation of the phenolic compounds which may then be removed. (Sinha-OEIS)
W74-10584

SEWAGE TREATMENT SYSTEM,
L. H. Cervantes.
U S Patent No 3,804,755, 3 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 1149, April 16, 1974.

Descriptors: *Patents, *Waste treatment, *Waste water treatment, *Sewage treatment, Water pollution control, Water quality control, Pollution abatement, Chlorination, Oxygenation, Filtration, Temperature, Pressure.

After screening and comminuting raw sewage it is subjected to chlorination. The chlorinated sewage is enriched with oxygen in excess of the capacity of the sewage to dissolve oxygen. Temperatures are increased to 100 deg to 110 deg C and pressures increased up to about 17 atmospheres to obtain organic and inorganic precipitates. The treated sewage is filtered and filtrate and purified effluent separately removed. (Sinha-OEIS)
W74-10585

COMPOSITE SEWAGE TANK,
Hession (Crowley), Wakefield, Mass.
F. X. Crowley.

U S Patent No 3,804,260, 3 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 1029, April 16, 1974.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, Water pollution control, Water quality control, Equipment, Effluents, Pollution abatement.
Identifiers: *Sewage tank.

The tank may be constructed of panels precast and initially assembled in circular or other closed formation with upright longitudinal channels or slots located between adjacent panels or spaced with respect to certain of them. These channels are subsequently filled and closed from top to bottom of the tank with cement or mortar and at an intermediate level certain panels contain inwardly projecting cantilever spoke sections or knees. These corbel units act collectively as fully efficient brackets upon which may be supported a circular settling chamber or trough. The inner wall of this trough forms a circular weir over which the liquid effluent flows into the trough. The corbel units may be cast at any selected level within the tank with the assistance of temporary forms. The bottom and side wall or walls of the effluent trough may be cast upon the firm foundation of the corbels. The effluent trough may be formed in part by the core wall of the tank itself or it may be located at a distance from the inner tank wall so that weir overflow takes place at both circumferential walls of the trough. (Sinha-OEIS)
W74-10586

STABILIZED FLOATING AERATION SYSTEM,
Clow Corp., Oak Brook, Ill.
G. Ross.
U.S. Patent No 3,802,673, 5 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 921, No 2, p 619, April 9, 1974.

Descriptors: *Patents, *Water purification, *Waste water treatment, Water quality control, Pollution abatement, *Aeration, Equipment.
Identifiers: *Aerators.

The stabilized floating aeration system is intended for use in a water purification plant. The open platform is connected to the aerator by mooring and guy lines. The floating platform provides a rigid polygonal frame that has excess buoyancy and is anchored to the bottom of the body of water by lines suspended from the corners of the polygon. The aerator comprises an impeller connected by drive means to a motor. The impeller is located at least partially below the water line and includes blades mounted for horizontal rotation about a vertical shaft or axis. The motor is located above the water line and is usually an electric motor which is connected to a shore power source by a water proof electric cord. The floating platform provides the buoyancy to support the aerator impeller in the desired vertical relationship to the water line. (Sinha-OEIS)
W74-10593

CONTROL OF ANAEROBIC DIGESTION PROCESS,
Combustion Engineering, Inc., Windsor, Conn.
A. S. Collins, and B. E. Gilliland.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE2, Paper 10475, p 487-506, April, 1974.

Descriptors: *Model studies, *Waste water treatment, *Anaerobic digestion, Flow rates, Biochemical oxygen demand, Activated sludge, Organic matter, Hydrogen ion concentration.
Identifiers: Overloads, Hydraulic overloads, Organic overloads, Digestor model, Dynamic models.

Waste water treatment plants are currently based mainly on steady-state relationships rather than dynamic models. However, variations occur in biological processes due to flow rates, organic matter concentrations, and BOD removal efficiency fluctuations. A dynamic model for the anaerobic digestion process was shown to be meaningful by Clemson University. This process considers pH response due to organic and hydraulic overloads. The results are based on the Andrews-Graef digester model, as simulated using Fortran IV. It was found that when predictive flow control is used with feedforward base addition as continuous compensation, base addition and flow rate are excessive. Reduction of the gain of the feedforward controller results in most desirable performance. (Prague-FIRL)
W74-10609

SEWER LINE DESIGN BASED ON CRITICAL SHEAR STRESS,
West Pakistan Univ. of Engineering and Technology, Lahore. Dept. of Sanitary Engineering.
For primary bibliographic entry see Field 8B.
W74-10611

LASER LIGHT USED TO LAY PIPE,
For primary bibliographic entry see Field 8A.
W74-10612

LARGE DIAMETER POLYETHYLENE FORGE MAINS INSTALLED QUICKLY,
For primary bibliographic entry see Field 8A.
W74-10613

THE DEVELOPMENT OF A NEW WATER TREATMENT,
M. Finan, and A. Atkinson.
The Stream and Heating Engineer, Vol 43, No 507, p 6-10, February, 1974. 4 fig, 3 tab.

Descriptors: *Waste water treatment, Salts, Crystals, Laboratory tests, Methodology, Heat transfer, Magnesium hydroxide, Flow, Calcium carbonate, Recirculated water, Coolingwater, Boilers.
Identifiers: *Belgard water treatment formulations, *United Kingdom.

The techniques used by CIBA-GEIGY (UK) Ltd. to develop, from laboratory to full scale use, the new Belgard range of water treatment formulations are described. The laboratory tests included: magnesium hydroxide deposition on heat transfer surfaces: static conditions; magnesikum hydroxide deposition on heat transfer surfaces: flowing conditions; and activities in simulated water recirculating. The additional following laboratory tests are described: threshold effects on various scale forming salts; crystal modification effects; calcium carbonate deposition on heat transfer sufraces: flowing conditions; and activities in steam raising boilers. (Merritt-FIRL)
W74-10614

ULTRAFILTRATION CONCEPT FOR SEPARATING OIL FROM WATER,
Abcor, Inc., Cambridge, Mass.
R. L. Goldsmith, and S. Hossain.
Available from NTIS, Springfield, Va. 22161 as AD-758 318, Price $5.45 printed copy; $2.25 microfiche. Final Contract Report to U S Coast Guard, January 1973. 126 p, 40 fig, 18 tab, 14 ref, 2 append. DOT-CG-24, 286-A.

Descriptors: *Water pollution control, *Water pollution treatment, *Oily water, Oil spills, Oil pollution, Emulsions, Oil wastes, Waste water treatment, *Filtration, *Separation techniques.
Identifiers: *Ultrafiltration.

Ultrafiltration with 1-inch diameter tubular membranes produced highly-purified water from oil emulsions. For kerosene, No. 6 Fuel oil, Venezuelan crude and lubricating oil at input ratios of 100 ppm to 90%, treated water was uniformly free of visible oil and had less than 10 ppm oil. Ultrafiltration rate depended on oil type, input ratio and operating conditions. Typically, rates were high (50-150 gal per day per sq ft) but decreased with time due to membrane fouling. Factors which increased emulsion stability or decreased concentration polarization minimized fouling. Membrane cleanup was simple and effective, with no loss in long-term membrane capacity in over 3000 continuous test hours, with cleanup each 72 hrs. Cost and physical requirements for systems of 10, 100, 1000, and 10,000 gpm were estimated for membranes in tubular and spiral wound configurations. (Knapp-USGS)
W74-10620

SEA WATER SYSTEM FOR AQUACULTURE OF ESTUARINE ORGANISMS AT THE SKIDAWAY INSTITUTE OF OCEANOGRAPHY,
Skidaway Inst. of Oceanography, Savannah, Ga.
D. B. White, R. R. Stickney, D. Miller, and L. H. Knight.
Available from NTIS, Springfield, Va 22161 as COM 73-10722 Price $3.00 printed copy; $2.25 microfiche. University of Georgia, Athens, Marine Science Center Technical Report Series No 73-1, January 1973. 18 p, 4 fig, 5 ref, 1 append.

Descriptors: *Filtration, *Waste water treatment, *Sea water, *Aquiculture, *Georgia, Estuaries, Organic matter, Clays, Microorganisms, Filters.

A filter system was developed capable of delivering over 100 gpm of clean sea water from an estuary for tests of aquiculture systems. As a result of the tremendous amount of plant biomass produced each year in the marshes at the water source in the estuary, large amounts of decaying organic matter are found in the untreated water. The organic material as well as the clay particles which enter the estuaries from land runoff serve as templates for bacterial colonization in addition to creating extremely high turbidities. Control of the quality of the water is a necessary precursor to any laboratory culturing of marine animals. (Knapp-USGS)
W74-10670

DETERMINATION OF INVESTMENT COST FUNCTIONS OF WATER TREATMENT PLANTS,
Illinois Univ., Urbana. Dept. of Business Administration.
For primary bibliographic entry see Field 5F.
W74-10691

EVALUATION OF PROTOTYPE CRUSHED LIMESTONE BARRIERS FOR THE NEUTRALIZATION OF ACIDIC STREAMS,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W74-10693

NEUTRALIZATION OF ACIDIC WASTES BY CRUSHED LIMESTONE,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W74-10694

THAT WASTE DISPOSAL PROBLEM,
Minnesota Univ., Minneapolis. Agriculture Extension Service.
R. E. Machmeier.
The Minnesota Volunteer, p 18-25, January-February, 1973. 3 illus.

Descriptors: *Minnesota, *Sewage disposal, *Septic tanks, *Lakes, *Percolation, Waste disposal, Pollution, Eutrophication, Public health, Sanitary engineering, Waste treatment, Sewage

treatment, Water pollution, Effluents, Waste water(Pollution), Soil density, Public benefits, Lakes, Streams, Natural resources, Waste water treatment, Water pollution treatment.
Identifiers: *Administrative regulations.

Methods of sewage disposal are recommended for the Minnesota shoreland property owner if health, home and quality of lake environment are to be protected. All sewage disposal systems are required to comply with the specifications of the 'Shoreland Standards' by July 1, 1977. Proper sewage disposal protects the public health from the disease vectors in the effluent and protects natural waters from eutrophication. A home sewage disposal system should consist of a septic tank and soil absorption system. The function, standard construction and building specifications for septic tanks are described in detail. Of the three types of soil absorption systems--the trench, the seepage pit, and the seepage bed--the trench system is recommended for its effectiveness and longevity. A soil percolation rate slower than sixty minutes per inch indicates soil unsuitable for a soil absorption system. (Dillingham-Florida)
W74-10726

TAILWATER,
For primary bibliographic entry see Field 3C.
W74-10760

REGIONALIZATION IN THE DELAWARE RIVER ESTUARY,
Delaware River Basin Commission, Trenton, N.J. Water Quality Branch.
R. Porges.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972. Fort McNair, Washington, D.C., p 129-143, 1973. 5 fig, 1 tab, 5 ref. FWQA 11060 DRO.

Descriptors: *Waste treatment, *Sewage districts, *Delaware River Basin Commission, *Urbanization, River basins, Economics, Political aspects, New Jersey, Pennsylvania, Delaware, Benefits, Industries, Activated sludge, Pilot plants, Facilities, Financing, Feasibility studies, Regulation.
Identifiers: *Delaware Estuary, *Regionalization, Waste treatment centralization, Deepwater project.

The regional wastewater treatment system is a logical extension of community services and the current answer to the growing megalopolis of the Delaware Estuary. Regionalization must protect water quality, be economically sound, and politically feasible. The Delaware River Estuary begins at Trenton, New Jersey and borders Pennsylvania, New Jersey, and Delaware. The principal pollution problem of the basin exists down river through the Philadelphia-Camden metropolitan area to below Wilmington, Delaware. Nearly 100 discharges encompassing communities and a wide variety of industries are involved in this reach of the river. The complexity of the wastes and the high degree of treatment required to meet state and the Delaware River Basin Commission's objectives dictated some type of biological treatment, probably activated sludge. The pilot plant for waste treatment demonstrated the feasibility of treating complex industrial-municipal wastes. The predominantly industrial wastes were equalized, neutralized, and treated in a 50-gallon-per minute activated sludge plant. The activated sludge system provided an excess of 90% BOD removal although color characteristics persisted. Carbon column effluent, showing an overall removal of 97% BOD and 93% color, meets all discharge requirements. (See also W74-10765) (Jones-Wisconsin)
W74-10775

REGIONAL WASTEWATER MANAGEMENT SYSTEMS FOR THE CHICAGO METROPOLITAN AREA,
Corps of Engineers, Washington, D.C.
K. B. Cooper.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution May 17-18, 1972. Fort McNair, Washington, D.C., p 163-175, 1973. 6 tab.

Descriptors: *Waste water treatment, *Alternate planning, *Sewage districts, Systems analysis, Cost comparisons, Annual costs, Capital costs, Unit costs, Land use, Water reuse, Financial feasibility, Design, Evaluation, *Illinois.
Identifiers: *Chicago(Ill), Per capita costs.

Central to the program of the regional wastewater management systems is the cost and performance of alternative systems. Feasibility reports of the Pilot Wastewater Management Program prepared by the Corps of Engineers contained preliminary cost estimates for alternative waste management systems to achieve high treatment levels. The capital and annual costs presented in the feasibility studies were only preliminary and not as yet fully indicative of the financial or economic costs for any one alternative system. A special study of the Chicago Metropolitan Area was undertaken to formulate least cost waste treatment management system alternatives in order to detail capital costs, operation, maintenance, and replacement costs and to analyze their relative merits. Summarized are criteria and assumptions of this special study, a description of each system including performance and evaluation, and a comparison with feasibility study findings. Assessment included identifying key parameters which were impacted by each of the systems, whereas evaluation established the beneficial and detrimental effects of each, associated opportunities, and the potential net contributions of the systems. Costs used in the feasibility study relied heavily on data generated from small-scale and experimental pilot systems; in the special study actual bid prices were used to the maximum extent possible. (See also W74-10765) (Jones-Wisconsin)
W74-10778

BAGS TO CLEAN UP SEWAGE.
New Scientist, Vol 61, No 890, p 754, March 21, 1974.

Descriptors: *Sewage treatment, Municipal wastes, *Water treatment, Treatment methods, Microorganisms, *Bacteria, Sewers, Pipes, Plastic pipes, *Waste water treatment, *Biological treatment.
Identifiers: Cholera bacteria, Dysentery amoeda, Emergency treatment.

An emergency sewage treatment system that kills cholera bacteria and dysentery amoeda has been developed by James Howard, a public health engineer working for Oxfam. It involves passing sewage into four or more seven meter diameter sausage-shaped neoprene bags filled with water and linked in series by plastic pipes. The water prevents air getting to the microorganisms which settle in the sludge at the bottom of the first neoprene section and die within a week or two. In an emergency, such as an earthquake a single seven meter section would be used when buried at the end of 24 hours. (Murphy-FIRL)
W74-10813

SOUND, OZONE ZAP GERMS.
Water and Wastes Engineering, Vol 11, No 3, p 56, March, 1974.

Descriptors: Water pollution, Water treatment, Treatment methods, *Disinfection, *Ozone, *Pilot plants, *Sound waves, *Waste water treatment.
Identifiers: *Ultra high frequency sounds, Sonication, Sozone treatment.

A wastewater treatment system combining ultra-high frequency sound and ozone is as effective as conventional methods of disinfection and may be superior, according to some scientists at Notre Dame University. Dr. Gary Burleson's research showed that treatment with sonication, ultra high frequency sound, and ozone totally inactivated each of three virus types in 15 seconds and six different bacteria, which cause such diseases as dysentery and cholera, in a minute or less. When sonication is teamed with ozone a synergistic effect seems to occur. A pilot plant using Sozone treatment has been in operation on the Notre Dame campus since 1971. Plans for further research on the ozone-sonication technique are being made to test the technique's effectiveness on other bacteria and viruses. (Murphy-FIRL)
W74-10814

PLANT GETS NEW PROCESS,
Ecolotrol, Inc., Bethpage, N.Y.
J. S. Jeris, and F. J. Flood.
Water and Wastes Engineering, Vol 11, No 3, p 45-48, March, 1974. 2 fig, 2 tab.

Descriptors: Water pollution, Water treatment, Treatment methods, Groundwater, *Water table, Aquifers, *New York, *Aquifer management, *Groundwater recharge, Saline water intrusion, *Waste water treatment.
Identifiers: *Nassau County(NY).

A novel biological denitrification process has been added to Nassau County's wastewater treatment plant. Combining the demands of the increased population with the growth of industry over the past 20 years, the amount of high quality water needed and the corresponding quantity of wastewater requiring treatment has more than tripled. The ground water table has been declining due to the increased demand for water, with a corresponding evidence of salt water intrusion, high nitrate-nitrogen concentration as well as other contaminants. Protection of the ground water was incorporated into a master plan which included a 500,000 mgd advanced wastewater treatment plant. A physical-chemical treatment system was built on the site of Nassau County's 60 mgd wastewater treatment plant at Bay Park. The goals of this plan were to learn what quality water could be obtained using this advanced water renovation plan, to determine the ability and ramifications of recharging treated water into the aquifer, and to obtain the cost of this extensive treatment and recharge operation. Nitrate- and nitrite-nitrogen removal is encouraging. The fluidized granular bed denitrification system show promise in supplanting the biological denitrification processes being used in the field today. (Murphy-FIRL)
W74-10815

CONSTRUCTION AND OPERATION OF A LABORATORY FERMENTER FOR KINETIC MEASUREMENTS IN WASTE WATERS (BAU UND BETRIEB EINES LABORATORIUMS-FERMENTORS FUR KINETISCHE MESSUNGEN AN ABWASSERN),
Institut fuer Organisch-Technisch Chemie. Deutsche Akademie der Wissenschaften zu Berlin, Leipzig (East Germany).
U. Behrens, M. Ringpfeil, H. Thielemann, G. Klappach, and D. Pohland.
Fortschritte Der Wasserchemie, No 15, p 203-215, 1973. 7 fig, 6 ref. English summary.

Descriptors: *Biological treatment, *Water purification, Aeration, *Fermentation, Kinetics, *Waste water treatment, *Treatment facilities.
Identifiers: *Laboratory fermenter.

The construction of a laboratory fermenter for studying biological purification processes in wastewaters is described. It consists of a 16 liter suspended vessel of Jena glass having an efficient aeration system. Biological wastewater treatment can proceed discontinuously, continuously and

continuously with sludge return. Control of temperature and pH value is possible. Carbon dioxide and oxygen are automatically determined in the outgoing air. (Murphy-FIRL)
W74-10816

PIPE JACKING -- A TECHNIQUE FOR SOFT GROUND TUNNELLING,
Cementation Co. Ltd., Calcutta (India).
For primary bibliographic entry see Field 8A.
W74-10821

QUANTITATIVE ESTIMATION OF DISINFECTION INTERFERENCES,
Water Research Association, Marlow (England).
E. S. Hall.
Journal of the Society for Water Treatment and Examination, Vol 22, No 3, p 153-174, 1973. 9 fig, 14 ref.

Descriptors: *Microorganisms, *Disinfection, *Equations, Chlorine, Ammonia, *Mathematical models, *Wastewater treatment, *Water treatment.
Identifiers: Disinfectants.

The inactivation of microorganisms and the reaction of chemical interferences with disinfectant at rates proportional to their concentration conform with the equation,-log base 10 (proportional survival of organism or residual interference) - kD/2.303, where D is the concentration of disinfectant integrated over time and k is a constant. Experimental data do not usually conform with the equation because more than one degree of susceptibility to disinfection or oxidation prevails. Within a certain range of values of D, however, data can be processed to conform and yield a value for k. The relationship between dose of disinfectant and contact time for a given value of disinfection level can then be calculated. Using existing constants for ammonia free chlorine reactions, progress in the formation of chloramines may be related to disinfection level. This enables optimum design of plant and disinfection control systems for a disinfection level appropriate to the water source. (Murphy-FIRL)
W74-10822

OPERATIONAL CONTROL CONCEPTS FOR THE ACTIVATED SLUDGE PROCESS,
Oklahoma State Univ., Stillwater. School of Civil Engineering.
J. H. Sherrand, and D. F. Kincannon.
Water and Sewage Works, Vol 121, No 3, p 44, 56, 64, 66, March, 1974. 2 fig, 2 tab, 4 ref.

Descriptors: *Model studies, *Mathematical models, *Activated sludge, Equations, Control, *Recycling, Microorganisms, *Waste water treatment.
Identifiers: *Continuous culture theory.

Control schemes advocated for recycling activated sludge processes frequently are based on empirical observation. Input of scientific knowledge to control models has been minimal. As a result of the use of microbial continuous culture theory for describing process relationships, several advances toward the understanding of basic process fundamentals have recently been made. The effect of altering process control variables is illustrated by the development of mathematical relationships that are descriptive of the activated sludge process, presentation of data obtained in a laboratory model activated sludge unit, and integration of data and equations to explain the consequences of altering process variables to the treatment plant operator. (Murphy-FIRL)
W74-10824

DESIGNING. PLUG IN A COMPUTER,
Potts, Stevens and McCoy, Wyomissing, Pa.
J. W. Brill.
Water and Wastes Engineering, Vol 11, No 2, p 39-41, February, 1974. 2 fig.

Descriptors: Automation, Instrumentation, *Waste water treatment, Engineering, *Computer programs, *Plant design.

Programs can be written in such a way that they can be of help in designing small installations where it is impossible to determine the design variables accurately, for example in biological waste treatment plants. The answers given by the computers would be approximate, and would allow selected values to be changed without disturbing any others. Such a program permits the user to try many designs on paper and to determine the effect of ranges of values of design variables. All this is possible using Basic or FORTRAN computer languages in such a way that the user need not know either language. An example is given to illustrate this method. (Murphy-FIRL)
W74-10825

MAGNITUDE OF WASTEWATER TREATMENT AND DISPOSAL PROBLEM FACING THE NATION,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
K. M. Mackenthun.
In: Underground Waste Management and Environmental Implications, Symposium held December 6-9, 1971, Houston, Texas, p 19-23, 3 fig, 2 tab, 7 ref.

Descriptors: Waste disposal, *Waste water treatment, Industrial plants, *Industrial wastes, Industrial water.
Identifiers: *Industrial pollution.

The response is described of 10,000 water-using industries to a questionnaire designed to collect information on quantity and quality of wastewater constituents and discharge methods. Data from this survey, and others by the Department of Commerce show that more than 300,000 water-using industrial plants discharge three to four times as much oxygen-demanding wastes as all of the nonindustrial wastes discharged to sewerage in the United States. Many wastes discharged by industries are toxic to aquatic life and, perhaps indirectly, to man. The volume of industrial wastewater discharge in 1968 exceeded 14 trillion gal. before treatment. Indications are that more than half of this wastewater volume comes from four major industrial groups: paper, organic chemicals, petroleum refining, and steel. Industrial pollution problems are created by oxygen-demanding wastewater constituents, organic and inorganic settleable solids, suspended solids, floatable materials, toxic metals or substances, nuisance-stimulating nutrients, and waste heat. Treatment and control processes are now available for most industrial wastes; however, some pollutants, including complex chemicals, present difficult abatement problems. (See also W72-14480) (Staplin-NWWA)
W74-10864

NITRATES IN WATER SUPPLIES.
International Water Supply Association, London (England). International Standing Committee on Water Quality and Treatment.
For primary bibliographic entry see Field 5B.
W74-10886

COLUMBUS REPLACES HISTORIC WATER TREATMENT PLANT,
Stilson (Alden E.) and Associates, Ltd., Columbus, Ohio.
K. W. Cosens, and F. Farr, Jr.
Public Works, Vol 105, No 6, p 60-62, June 1974. 1 fig, 1 tab, 1 ref.

Descriptors: *Treatment facilities, *Waste water treatment, Construction materials, Construction costs, Design criteria, Sites, Water supply, *Water treatment, History, *Ohio.
Identifiers: *Columbus(Ohio).

A 65 mgd new plant supply facility is replacing the Dublin Road Plant in Columbus, Ohio. The new treatment plant is being constructed in two phases: the first involving a functional plant of full capacity; and the second involving demolition of old chemical buildings, filters, flocculation and settling tanks, and wash-water facilities, followed by construction of additional clear well capacity, underground piping, a chemical handling facility, lighting, roads, fencing, and landscaping. Treatment consists of screening, coagulation with alum, softening with lime and soda ash or caustic soda, recarbonation, pre- and post-chlorination, taste and odor control, and threshold treatment. Treatment plant construction costs are estimated at $15.5 million. (Sandoski-FIRL)
W74-10888

EFFECT OF PH ON SURVIVAL OF ESCHERICHIA COLI,
Central Public Health Engineering Research Inst., Nagpur (India).
N. M. Parhad, and N. U. Rao.
Journal of the Water Pollution Control Federation, Vol 46, No 5, p 980-986, May 1974. 7 fig, 16 ref.

Descriptors: *E. coli, *Oxidation lagoons, *Bioindicators, Effluents, *Hydrogen ion concentration, *Waste water treatment, Algae, Growth rates, Laboratory tests.

An attempt has been made to delineate the factors affecting bacterial reduction of effluents in stabilization ponds using E. coli as a representative of the indicator bacteria. A 24-hour peptone broth culture of E. coli isolated from waste water was used in these experiments with evaluation by multitube dilution technique using lactose broth in the presumptive test at 37C for 24 to 48 hours. Results are discussed and the following conclusions drawn. The growth of different algae in sterilized waste water results in an increase of pH from 7.5 to 10 or more. Both E. coli and algae can grow together when waste water is buffered at pH 7.5 but E. coli could not grow in waste water when the pH was greater than 9.2. E. coli, when grown in association with algae, is eliminated because of the high pH produced as a result of algal growth. The decrease in E. coli observed in stabilization ponds is attributed to the pH levels that are found in those ponds. (Sandoski-FIRL)
W74-10890

THE AGRICULTURAL USE OF BLACKBURN SEWAGE SLUDGE,
Blackburn County Board Corp. (England).
E. Rawcliffe, and G. W. Saul.
Water Pollution Control, Vol 73, No 2, p 168-177, 1974. 4 fig, 3 tab, 25 ref.

Descriptors: *Agricultural engineering, Soil physics, *Soil conservation, *Sewage sludge, Surveys, *Metals, Topsoil, Soil investigations, *Water reuse, Soil texture, Soil strength.

Experiences associated with agricultural use of Blackburn, England's sewage sludge are described. Over the years, the repeated addition of sewage sludge to the Blackburn estate has had a physical effect on the surface of the land. The soil became soft and waterlogged, and the frequency of application as practiced precluded any remedial action by means of plowing. Work has now commenced on a complete soil survey of the whole sewage works estate with special reference being given to metals. The present policy regarding the new areas of farmland now being treated with digested sludge by mobile tankers is to acquire the use of sufficient land so that over the next thirty years at least the accumulation of metals conforms to well within the suggested limits of 250 mg per liter zinc equivalent in the top soil. (Sandoski-FIRL)
W74-10895

5E. Ultimate Disposal Of Wastes

WASTEWATER TREATMENT AND DISCHARGE SURVEY, OFFUTT AFB NE, OCT 1973,
Environmental Health Lab., Kelly AFB, Tex.
For primary bibliographic entry see Field 5D.
W74-10355

STATE OF THE ART REPORT ON MARINE SANITATION DEVICES,
Automation Industries, Inc., Silver Spring, Md. Vitro Labs. Div.
For primary bibliographic entry see Field 5D.
W74-10360

STATE OF MARYLAND WASTE OIL RECOVERY AND REUSE PROGRAM,
Environmental Quality Systems, Inc., Rockville, Md.
For primary bibliographic entry see Field 5D.
W74-10539

(CITY OF SUDBURY, ONTARIO, CANADA).
For primary bibliographic entry see Field 5D.
W74-10555

AN EXPERIMENT ON DISPOSAL OF METAL WORKING OIL EMULSION INTO SEWER SYSTEMS (KINZOKU KAKOYU NO HAISUI SHORI NI KANSURU ICHI JIKKEN),
Kao Soap Co., Tokyo (Japan). Industrial Research Labs.
For primary bibliographic entry see Field 5D.
W74-10559

REGIONAL LANDFILL AND CONSTRUCTION MATERIAL NEEDS IN TERMS OF DREDGED MATERIAL CHARACTERISTICS AND AVAILABILITY: VOLUME 1: MAIN TEXT; VOLUME II: APPENDIXES,
Green Associates, Inc., Towson, Md.
For primary bibliographic entry see Field 5G.
W74-10624

OCEAN WASTE DISPOSAL IN THE NEW YORK BIGHT,
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
For primary bibliographic entry see Field 5B.
W74-10655

THE STRANGE WORLD OF MISCIBLE DISPLACEMENT,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-10664

PRACTICES AND PROBLEMS IN THE CONFINEMENT OF DREDGED MATERIAL IN CORPS OF ENGINEERS PROJECTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
W. L. Murphy, and T. W. Zeigler.
Technical Report D-74-2, May 1974. 176 p, 44 fig, 3 tab, 52 ref, 4 append.

Descriptors: *Dredging, *Waste disposal, *Water pollution control, Sediments, Water pollution sources, Spoil banks, Landfills, Sediment control.
Identifiers: *Dredging wastes.

Confined disposal of dredged material is increasing because of recent requirements for containment of dredged material that is considered polluted and the resulting curtailment of much open water disposal. A diminishing supply of suitable disposal areas, caused by filling of existing sites and difficulties in acquiring sites because of environmental or cultural constraints, has become a major problem. Long-distance piping of dredged material, diking of disposal areas in water, and acquisition of permanent disposal facilities are possible solutions to this problem. (Knapp-USGS)
W74-10665

LITERATURE REVIEW ON RESEARCH STUDY FOR THE DEVELOPMENT OF DREDGED MATERIAL DISPOSAL CRITERIA,
Texas Univ., Dallas. Inst. for Environmental Studies.
For primary bibliographic entry see Field 5B.
W74-10686

SANITARY LANDFILL LEACHATE INTERACTIONS WITH A CARBONATE-ROCK DERIVED SOIL IN CENTRAL PENNSYLVANIA,
Pennsylvania State Univ., University Park. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 5B.
W74-10827

MAGNITUDE OF WASTEWATER TREATMENT AND DISPOSAL PROBLEM FACING THE NATION,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
For primary bibliographic entry see Field 5D.
W74-10864

BASIC DISPOSAL-WELL DESIGN,
Du Pont de Nemours (E.I.) and Co., Wilmington, Del. Engineering Service Div.
For primary bibliographic entry see Field 5B.
W74-10865

DEEP-WELL ACID DISPOSAL--PLANNING AND COMPLETION,
Halliburton Services, Duncan, Okla.
For primary bibliographic entry see Field 5B.
W74-10866

REQUIREMENTS FOR THE MONITORING OF INDUSTRIAL DEEP-WELL WASTE-DISPOSAL SYSTEMS,
Dow Chemical Co., Houston, Tex.
For primary bibliographic entry see Field 5B.
W74-10867

CONTROL OF UNCONSOLIDATED SANDS IN WASTE-DISPOSAL WELLS,
Subsurface Disposal Corp., Houston, Tex.
For primary bibliographic entry see Field 8A.
W74-10868

DEEP DISPOSAL SYSTEMS FOR RADIOACTIVE WASTES,
Office of Environmental Affairs (AEC), Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-10869

LIABILITY FOR HARM FROM UNDERGROUND WASTE DISPOSAL,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 5B.
W74-10870

REGULATION OF SUBSURFACE DISPOSAL IN TEXAS,
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 5B.
W74-10871

5F. Water Treatment and Quality Alteration

OZONE TREATS ARCTIC WATERS,
Arctic Health Research Centre, College, Alaska. Environmental Sciences Branch.
L. C. Reid, and H. S. Potworowski.
Water and Pollution Control, Vol 112, No 3, p 53-55, March 1974. 6 fig, 2 tab.

Descriptors: *Water purification, *Ozone, *Arctic, Iron, Manganese, Organic matter, Color, *Water treatment, Investigations, Filtration, Sedimentation, Tastes, Groundwater, *Alaska.

The application of ozone as a useful water conditioner for cold water sources was investigated for water supplies in Alaska. It is feasible to use ozone for iron, manganese, organics, and color removal in cold waters. From the results obtained, it would appear that ozone may be the answer to the need for better iron and manganese removal from arctic water suppliers. If the water is of acceptable hardness after removal of iron and manganese, the only treatment of the raw water would be for ozonation, sedimentation, and filtration. The resulting water would be free of odors and obnoxious tastes, and would be clear. Staining of clothes and fixtures would be eliminated. A side benefit of the ozonation process would be the purification. It is recommended that an attempt be made to develop a pilot ozonation plant that would treat groundwater for removal of iron, manganese, color, and organics. (Merritt-FIRL)
W74-10556

WATER TREATMENT CHEMICALS.
For primary bibliographic entry see Field 5D.
W74-10565

TOWN 'CAPTURES' NATURAL SPRING: CUTS WATER TREATMENT COSTS,
Allen and Hoshall, Memphis, Tenn.
L. B. Allen.
The American City, Vol 89, No 5, p 65-66, May 1974.

Descriptors: *Water supply development, *Groundwater, *Water sources, *Springs, Dams, Reservoirs, Costs, *Tennessee, Hydrogen ion concentration, *Water treatment.

The city of Elizabethton, Tennessee found that groundwater from springs could be used to increase water-supply capabilities by 40 percent. By building an earth cofferdam around the springs discharge area, a concrete receiving reservoir could act as a pump sump. The operating and maintenance costs for the 1.4 mgd Valley Forge Spring are very low. The water has a pH of 8.7 and is noncorrosive, has no bacteria harmful to public health, and should provide adequate supply through 1980. (Prague-FIRL)
W74-10567

ORGANIZATION AND SANITARY-HYGIENIC EVALUATION OF THE DRINKING WATER SUPPLY OF OIL AND GAS REGIONS OF THE NORTHERN OB AREA, (IN RUSSIAN),
Tyumenskii Gosudarstvennyi Meditsinskii Institut (USSR).
V. I. D'Yakov.
Gig Sanit. Vol 37, No 10, p 95-96, 1972.
Identifiers: Hygienic evaluation, Oil and gas regions, *Ozonization, Sanitary conditions, *USSR(Siberia-Northern Ob area), Potable water, *Water treatment, Public health, *Decontamination.

Under the climatic conditions of Siberia processes of natural self-purification of water occur extremely slowly. It is expedient to use ozonization as a more effective method of decontaminating

drinking water, especially in regions unfavorable in sanitary and epidemiological respects, such as in oil and gas producing regions.--Copyright 1973, Biological Abstracts, Inc.
W74-10581

THE EFFICACY OF USING ACTIVATED CARBON FOR FINAL PURIFICATION OF DRINKING WATER, (IN RUSSIAN),
Permskii Politekhnicheskii Institut (USSR).
Ya. I. Vaisman, S. Ya., Barikhin, S. L. Glushankov, E. A. Kovaleva, and A. M. Korkin.
Gig Sanit. Vol 37, No 7, p 106-108, 1972.
Identifiers: *Activated carbon filters, Water purification, Potable water, Filters, *Water treatment, *Filtration, *Organoleptic properties.

Compact activated carbon filters, either in water works, or in consumer units, could be used for improving the organoleptic properties of drinking water.--Copyright 1973, Biological Abstracts, Inc.
W74-10599

DETERMINATION OF INVESTMENT COST FUNCTIONS OF WATER TREATMENT PLANTS,
Illinois Univ., Urbana. Dept. of Business Administration.
H. Hinomoto.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 547, $3.25 in paper copy, $2.25 in microfiche. Illinois Water Resources Center, Urbana, Research Report No. 87, 1974. 35 p, 8 tab, 2 fig, 9 ref. OWRR A-055-ILL(2). 14-31-0001-3513.

Descriptors: Water treatment, Surface waters, *Treatment facilities, *Investment, Economies of scale, *Diseconomies of scale, *Cost comparisons, *Cost analysis, *Cost trends.
Identifiers: *Cost functions, Investment costs.

Functions representing the relationship between the capacity of a water treatment plant and its investment cost are found in studies by Orlab and Lindorf, by Koening, and by Ackermann. These functions were based on samples of plants constructed in the long period of 1930's - early 1960's. To update the above studies, this study determines similar investment cost functions for the surface-water and ground-water plants, using samples of plants mostly constructed in the short period of 1968-1971. Further, it determines similar cost functions for major components of each type of plant that have not been available in the past studies. A significant difference exists between the result of this study and the results of the past studies on the surface-water plant. The cost functions of the past studies indicate economies of scale in investment cost, whereas the function of this study indicates small but positive diseconomies of scale.
W74-10691

QUANTITATIVE ESTIMATION OF DISINFECTION INTERFERENCES,
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 5D.
W74-10822

COLUMBUS REPLACES HISTORIC WATER TREATMENT PLANT,
Stilson (Alden E.) and Associates, Ltd., Columbus, Ohio.
For primary bibliographic entry see Field 5D.
W74-10888

IS THE WATER SAFE TO DRINK. PART I: THE PROBLEM,
Environmental Defense Fund, Washington, D.C. Water Resources Program.
R. H. Harris, and E. M. Brecher.
Consumer Reports, Vol 39, No 6, p 436-443, June 1974.

Descriptors: *Domestic water, *Public health, *Water pollution, *Potable water, *Water quality standards, Accidents, Contamination, Costs, Water supply, *Attitudes.

The United States is currently in the process of implementing a mammoth Federal-state program to clean up its waterways. Even if this program proceeds on schedule, it will take more than a decade to achieve its goals. Faster action is urged on a program to upgrade the drinking water now being used in over 40,000 community water systems. The reasons given for urging such a program include the fact that even if all man-made pollution were eliminated, there would still be natural sources of pollution that would necessitate purification operations. There will always be some pollution from accidental spills or discharges, and agricultural runoff, if water pollution abatement is put off as air pollution abatement has been, the United States will be drinking dirty water for some time to come. The costs of improving drinking water now are reasonable enough in view of the extra health protection which would be gained. Types of pollution discussed include: asbestos, bacteria, viruses, heavy metals, and organic compounds. (Shaffer-FIRL)
W74-10897

5G. Water Quality Control

WATER QUALITY STANDARDS SUMMARY FOR INTERSTATE WATERS OF THE COMMONWEALTH OF VIRGINIA.
Environmental Protection Agency, Philadelphia, Pa.; and Virginia State Water Control Board, Richmond.
Available from NTIS, Springfield, Va. 22161 as PB-227 213, Price $11.75 printed copy; $2.25 microfiche. Virginia State Water Control Board, Summary Report, 1971. 149 p, 71 fig, 37 tab.

Descriptors: *Water pollution control, *Federal Water Pollution Control Act, *Virginia, Water quality act, Water quality control, *Water quality standards.
Identifiers: Water quality standards(Va).

The Commonwealth of Virginia adopted a policy to protect its high quality interstate waters, and amended their standards effective July 20, 1970. It is the public policy of the Commonwealth of Virginia that waters whose existing quality is better than the established standards as of the date on which such standards become effective will be maintained at high quality; provided that the Commonwealth of Virginia has the authority to approve any project or development which would constitute a new or an increased discharge of effluent to high quality water, when it has been affirmatively demonstrated that a change is justifiable to provide necessary economic or social development, and provided further, that the necessary degree of waste treatment to maintain high water quality will be required where physically and economically feasible. Present and anticipated use of such waters will not be precluded. (Knapp-USGS)
W74-10354

PORT COLLECTION AND SEPARATION FACILITIES FOR OILY WASTES, VOLUMES I-IV,
Harris (Frederic R.) Inc., New York.
For primary bibliographic entry see Field 5D.
W74-10357

POLLUTION ABATEMENT; DISPOSABILITY RATINGS OF PACKAGING MATERIALS USED ABOARD UNITED STATES NAVAL SHIPS,
Naval Ship Research and Development Center, Annapolis, Md. Materials Dept.
H. E. Achilles.
Available from NTIS, Springfield, Va. 22161, AD-774 475, Price $3.25 printed copy, $2.25 microfiche. Report No 4196, Vol 1, January 1974. 34 p, 1 fig, 8 tab, 11 ref.

Descriptors: *Waste disposal, *Ships, *Solid wastes, Water pollution sources, Water pollution control, Sea water.
Identifiers: *Packaging wastes.

A major effort in the Navy's environmental protection program is to minimize the quantity of solid waste that ships must dispose of at sea. Packaging and packaging materials associated with supply items are a major component of shipboard solid wastes. Criteria for rating shipboard disposability characteristics of packaging materials constrained by shipboard process capabilities to handle the materials are presented. (Knapp-USGS)
W74-10398

ECOLOGY OF ANOPHELES (M.) PULCHERRIMUS THEOB. IN IRRIGATED DESERTS, (IN RUSSIAN),
Ashkhabadskii Institut Epidemiologii i Gigieny (USSR).
G. A. Babayants.
Med Parazitol Parazit Bolezn. Vol 41 No 5, p 524-531, 1972. Illus.
Identifiers: *Arid land reclamation, *Mosquitoes, Anopheles-hyrcanus, *Anopheles-pulcherrimus, Anopheles-Superpictus, Cattle, Deserts, Ecology, *Irrigated deserts, Land reclamation, *USSR(Turkmen-Kara Kum canal).

The reclamation of arid land through the building of the Kara Kum canal (Turkmen SSR, USSR) affected the mosquito population in that area. Of 21 spp. found, the most abundant were Anopheles pulcherrimus (6.1-19.6%), A. hyrcanus and A. superpictus. The highest number of larvae (77.9%) were found in densely overgrown bodies of water throughout the year. Mosquitoes were attracted to human and domestic animal inhabited areas, especially cattle barns. The first larvae of the 4th instar appeared in the beginning of April and the imago in the second half of April. Many larvae also survived the winters. In SE Kara Kum the greatest number of mosquitoes were found in Sept. The wide distribution of the mosquitoes hinders control of the adult; instead, the larvae must be controlled.--Copyright 1973, Biological Abstracts, Inc.
W74-10406

PLANNING AND WASTEWATER MANAGEMENT OF A COMBINED SEWER SYSTEM IN SAN FRANCISCO,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10413

OPTIMIZATION TECHNIQUES FOR MINIMIZATION OF COMBINED SEWER OVERFLOW,
Dept. of Civil Engineering. Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 5D.
W74-10415

RHODE ISLAND'S OCEAN SANDS: MANAGEMENT GUIDELINES FOR SAND AND GRAVEL EXTRACTION IN STATE WATERS,
Rhode Island Univ., Kingston. Coastal Resources Center.
M. J. Grant.
Available from NTIS, Springfield, Va 22151 as COM-74-10158, Price $3.50 printed copy; $2.25 microfiche. Marine Technical Report No 10, 1973. 51 p, 24 fig, 153 ref.

Descriptors: *Mining, *Sands, Gravels, *Rhode Island, *Aggregates, Construction materials, Dredging, Regulation, Legislation, Environment, Water pollution control.

The marine sand and gravel mining industry was studied to project its probable impact on Rhode Island's marine environment. A model legislative proposal is given for the regulation of hard mineral mining in Rhode Island State waters. Trends in the sand and gravel industry will make it necessary to manage Rhode Island's offshore and estuarine sand and gravel resources. U.S. comsumption of sand and gravel is accelerating. An annual consumption of 500 million tons in 1954 had nearly doubled to 980 million tons by 1970, and it is projected that 1,670 million tons will be consumed in 1985 and 2,530 million tons in 2000. The demand for aggregate material is greatest in metropolitan areas where residential, industrial and construction users are concentrated. The low unit value of the resource and the high cost of transportation dictate minimal separation of quarry and market. The producers of sand and gravel, however, are being prevented by suburban expansion, zoning restrictions and high land costs from developing new close-in deposits as those presently worked are depleted. As land supplies dwindle and costs rise, it becomes increasingly attractive to look elsewhere for cheap and reliable sources. Extensive, nearby and high quality deposits are found in several areas off the New England coast. Rhode Island legislation relevant to marine mining has a number of powers which might usefully be applied to the regulation of marine sand or gravel mining. More specific legislation is needed and a Proposed Regulatory System is included as an appendix to this study. (Knapp-USGS)
W74-10437

DEVELOPMENT OF A BATCHWISE IN-SITU REGENERATION TYPE SEPARATOR TO REMOVE OIL FROM OIL-WATER SUSPENSIONS,
Hydronautics, Inc., Laurel, Md.
For primary bibliographic entry see Field 5D.
W74-10441

TEST AND EVALUATION OF OIL POLLUTION ABATEMENT DEVICES FOR SHIPBOARD USE, PHASE II,
Coast Guard, Washington, D.C. Naval Engineering Div.
For primary bibliographic entry see Field 5D.
W74-10444

STUDY ON THE REMOVAL OF INORGANIC AND ORGANIC MERCURY IN WASTE WATER BY THE FLOTATION METHOD,
Kyoto Univ.,(Japan). Dept. of Mineral Science and Technology.
For primary bibliographic entry see Field 5D.
W74-10470

PRITTLE BROOK DIVERSION TUNNEL,
For primary bibliographic entry see Field 8A.
W74-10482

MOLECULE SEPARATOR,
LKB - Produkter A.B., Bromma (Sweden).
For primary bibliographic entry see Field 8A.
W74-10491

SAFETY INSTALLATIONS FOR THE PREVENTION OF POLLUTION THROUGH LEAKAGE IN A PIPELINE,
For primary bibliographic entry see Field 5D.
W74-10494

PROCESS AND APPARATUS FOR THE SEPARATION OF LIQUID MIXTURES,
For primary bibliographic entry see Field 5D.
W74-10495

ANNUAL STATE STRATEGY FOR WATER QUALITY CONTROL, FISCAL 1973-74.
California State Water Resources Control Board, Sacramento.
July 1973. 143 p, 11 append.

Descriptors: *Estuaries, *Water quality control, *Water resources development, *Pollution abatement, *Water policy, California, Water demand, Water conservation, Project planning, Administration, Legislation, Groundwater basins, Sea water, Water quality, Water resources, Water supply.

Presented are a statewide assessment of water quality problems and their causes, a listing of the geographical or discharger priorities of these problems, and a listing of the priorities and scheduling of permits, construction grants, basin plans and other appropriate program actions that make up California's water quality control strategy. California's water quality problems and causes are assessed in a general manner. Three categories of problems are addressed: inland surface waters and estuaries, marine waters and groundwater, and the National Water Strategy. The criteria to be used in making the strategy responsive to the state's geographical priorities are discussed. These criteria, including the severity of pollution problems, the population affected and the need for preserving high quality waters, are used to rank surface water bodies, ground-water basins and the discharges to each. Strategic objectives and an implementation of the plan are described as are the objectives of eleven state water quality management programs and the strategy each will employ to correct pollution problems. (Sutton-Florida)
W74-10502

THE BLACK TIDE,
Washington Univ., Seattle. Center for the Biology of Natural Systems.
J. McCaull.
Environment, Vol 11, p 2-16, November 1969. 8 photo, 25 ref.

Descriptors: *Oil industry, *Oil wastes, *International waters, *Wildlife conservation, Food chains, Water birds, Fishing, Recreation, Exploitation, Oily water, Water pollution sources, Oil wells, Boats, Photosynthesis, Chemical wastes, Oxygen, Oil spills, Water pollution control.
Identifiers: *Coastal waters.

There is a great danger of serious pollution from the all out search for oil. The short term biological effects of crude oilspills appear to be limited to the destruction of waterfowl. They also posed a longer range threat to marine life, the fishing industry, recreation, and the habitats of animals and plants. Most oil spills have resulted from numerous tanker mishaps, which generally occur near ports. With increased tonnage and ships the probability of more mishaps is greater. Offshore drilling also contributes to pollution, as well as the discharge of oily ballast by ships. Though oil loses much of it toxicity after being weathered in the ocean, the amount of oil dumped in the ocean is equal to the amount of natural hydrocarbons produced there. Fuel oil is much more toxic than crude oil. Several methods have been employed to disperse oil including straw and chemical dispersants. However, these chemicals are potentially more dangerous than the oil they disperse. As of yet there are no reliable countermeasures that can be taken after there is an oil spill. (Sperling-Florida)
W74-10505

THE FEDERAL OCEAN PROGRAM. THE ANNUAL REPORT OF THE PRESIDENT TO THE CONGRESS ON THE NATION'S EFFORTS TO COMPREHEND, CONSERVE, AND USE THE SEA.
Office of Science and Technology, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10506

OIL POLLUTION CONTROL.
For primary bibliographic entry see Field 6E.
W74-10509

IN RE MAINE CLEAN FUELS, INC. (JUDICIAL REVIEW OF DENIAL OF APPLICATION FOR PROPOSED OIL REFINERY).
For primary bibliographic entry see Field 6E.
W74-10510

NEW ENGLAND RIVER BASINS COMMISSION 1973 ANNUAL REPORT.
New England River Basins Commission, Boston, Mass.
For primary bibliographic entry see Field 6E.
W74-10512

WATER POLLUTION--PROHIBITIONS.
For primary bibliographic entry see Field 6E.
W74-10516

ASKEW V. AMERICAN WATERWAYS OPERATORS, INC., REVISITED (COMMENTARY).
Natural Resources Journal, Vol 14, p 153-156, January 1974.

Descriptors: *Oil spills, *Federal-state water rights conflicts, *Judicial decisions, *Water Quality Act, *Federal Water Pollution Act, Legislation, Navigable waters, Oil, Oil industry, Water pollution, Water pollution sources, Water pollution control, Federal government, State governments, Constitutional law, Legal aspects, Water law, *Florida, Oil pollution, Adoption of practices, Pollution abatement, Water quality.

In 1971, a federal court ruled that the Florida Oil Spill and Pollution Control Act was unconstitutional, declaring it to be in conflict with the Water Quality Improvement Act (WQIA), an amendment to the Federal Water Pollution Control Act (FWPCA). But in 1973, the United States Supreme Court reversed that decision, declaring that the Florida legislation was an exercise of Florida's police power over maritime matters and was considered a vital part of an integrated effort to control oil pollution. The main objection to the Florida legislation in the lower court stemmed from its imposition of much stricter standards of liability than were imposed by the WQIA. The Florida Act also leaves the offender little chance of formulating a valid defense, while the WQIA excuses spillage caused by governmental negligence, third party acts, acts of God, or acts of war. The Florida legislation was also viewed as being in direct conflict with federal legislation governing disposition of claims involving coastal oil pollution. However, the Supreme Court found the provisions of the Florida legislation not to be in conflict with the WQIA, but rather supplementary to it, and therefore constitutional. (Ritchie-Florida)
W74-10518

LEGISLATIVE HISTORY OF FEDERAL RIVER BASIN PLANNING ORGANIZATIONS,
For primary bibliographic entry see Field 6E.
W74-10520

SIERRA CLUB V. MASON (MOTION TO VACATE INJUNCTION BARRING HARBOR DREDGING PROJECT).
For primary bibliographic entry see Field 6E.
W74-10522

ENVIRONMENT IMPACT REQUIREMENTS IN THE STATES: NEPA'S OFFSPRING,
Center for California Public Affairs, Claremont.
For primary bibliographic entry see Field 6E.
W74-10527

RECONNAISSANCE OF THE FLUSHING CHARACTERISTICS AND WATER QUALITY IN COASTAL CANALS OF THE GULF OF MEXICO,
University Southern Mississippi, Hattieburg.
For primary bibliographic entry see Field 5B.
W74-10531

SURVIVAL OF ESCHERICHIA COLI IN OLIGOTROPHIC WATERS,
Washington State Univ., Pullman. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5C.
W74-10535

WASTEWATER ABATEMENT IN CANNING VEGETABLES BY IQB BLANCHING,
Wisconsin Univ., Madison. Dept. of Food Science.
For primary bibliographic entry see Field 5D.
W74-10545

LEGAL ASSURANCES OF ADEQUATE FLOWS OF FRESH WATER INTO TEXAS BAYS AND ESTUARIES TO MAINTAIN PROPER SALINITY LEVELS,
Texas Univ., Austin. School of Law.
For primary bibliographic entry see Field 6E.
W74-10549

SANITARY LANDFILL THREATENS LAKE.
For primary bibliographic entry see Field 5B.
W74-10553

PROCESS DESIGN AND OPERATION FOR ZERO EFFLUENT DISCHARGE,
Environmental Science and Engineering, Inc., Gainesville, Fla.
For primary bibliographic entry see Field 5D.
W74-10554

ASH-HANDLING SYSTEM ELIMINATES RUNOFF POLLUTION.
Electrical World, Vol 181, No 4, p 50-51, February 15, 1974. 5 fig.

Descriptors: *Runoff, *Water quality standards, *Automation, Solid wastes, *Waste disposal, Sluices, Pumps, Recirculated water, Water pollution control, *Recycling, *Waste treatment.
Identifiers: *Ash handling systems.

The elimination of runoff from the ash handling operation at Niagara Power Corporation's Dunkirk Station to meet newly adopted local water quality standards is described. The water was recirculated to sluice pumps, commercially acceptable dry ash was generated, and a means for disposing of that ash was provided. The system is highly automated and requires less operator attention than the previous ash handling method. In addition to eliminating pollution, the new system permits townships to use the bottom ash on roads. Before installation of the system, ash from the settling ponds had to be loaded into trucks with a front end loader which took considerable time. Now dump trucks can be filled almost instantaneously. Most of the ash is now used by local municipalities for road construction, the rest is being used as cover at a fly ash landfill location. (Merritt-FIRL)
W74-10564

NEW OIL SPILL CLEANUP TOOL FOR COMMERCIAL PRODUCTION.
Oil Week, Vol 25, No 8, p 30, April 8, 1974.

Descriptors: *Oil spills, *Water purification, Oil pollution, Water pollution control, Flow, *Floats, *Canada, *Separation techniques, Pollution abatement.
Identifiers: *Booms.

The first effective tool for containing and cleaning up oil spills in medium to fast moving waters will shortly go into commercial production. The Petroleum Association for the Conservation of the Canadian Environment developed a boom which consists of two inflated floats cased in a fabric, each about 50 ft long between which is suspended netting and a special nonwoven material. It is placed across the current flow at an angle and some oil is diverted by the leading float toward the downstream end for recovery. Most of the oil flows with the water under the leading float, passes through the netting and flows along the face of the nonwoven fabric which is designed to permit the water to pass through, but not the oil. The oil comes to the surface of the ponded area between the two floats, where a tangential current carries it to the downstream end of the boom where it is collected and recovered. The boom weighs only 2 lb/ft and can be shortened or lengthened in sections. (Merritt-FIRL)
W74-10566

A MATHEMATICAL MODEL OF A RIVER PURIFICATION LAKE,
Severn River Authority (England).
For primary bibliographic entry see Field 5C.
W74-10571

FLOATING BOOM,
Pacific Pollution Control, San Francisco, Calif. (assignee)
N. D. Tanksley.
U S Patent No 3,807,178, 7 p, 7 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 1809, April 30, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, Equipment, Barriers, Separation techniques, Floats.
Identifiers: *Booms.

The floating boom comprises a sheet-like barrier, having several floats which are removable. The floats are formed with a frame having a movable portion for movement into and out of engagement. The frame includes a pair of juxtaposed upright sections hinged securely at the lower ends of the upright parts. The float elements are secured to the frame in an outrigger type of construction which enhances stability of the water and provides a channel between the floats and the partition for passage of oil and water. The frame, including arm members, may be formed of 304 stainless steel, with the upright members having a U-shaped channel cross section for additional rigidity. (Sinha-OEIS)
W74-10579

FLOATING BOOM STRUCTURES,
Sanera Projecting A.B., Nordmaling (Sweden). (assignee)
P. O. Oberg.
U S Patent No 3,807,177, 5 p, 11 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 1808, April 30, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, Equipment, *Barriers, *Flotsam, Separation techniques.
Identifiers: *Booms.

A boom has a curtain of cloth-like material depending vertically in the water and being supported by buoyant bodies. The vertical position is maintained by weights attached to the lower edge of the curtain. The buoyant bodies comprise hermetically sealed buoyant bags of soft cloth material which is impermeable to liquid. They enclose a constant quantity of gas, preferably air. They are attached to the curtain so that the quantity of gas enclosed in each buoyant bag when subjected to water pressure as the boom is placed in the water can be freely pressed up towards an upper portion of the buoyant bag to create in this portion a balloon-like swelling. (Sinha-OEIS)
W74-10580

FLOATAGE COLLECTING APPARATUS AND METHOD,
JBF Scientific Corp., Burlington, Mass.
J. H. Farrell, R. A. Bianchi, and E. E. Johanson.
U S Patent No 3,804,251, 8 p, 8 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 1027, April 16, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Flotsam, *Pollution abatement, Water pollution control, Water quality control, Skimming, *Separation techniques.

Equipment incorporates a surface craft carrying an endless belt. The lower flight of the belt forms a downward and forward facing inclined surface which is openly exposed to the water at the bow of the craft. A well-like open-bottomed enclosure is at the aft end of the lower flight of the belt. A drive mechanism moves the belt to advance the lower flight from the forward roller to the rearward and lower submerged roller surface. This motion carries flotsam or oil downward. At the submerged aft roller surface, the belt turns upward, discharging the flotsam or oil trapped under it into the enclosure. The open-bottomed enclosure is fitted with a baffle structure. As the 'floatage' accumulates it displaces the water. An optional plate spaced below the baffle to diminish the passage of turbulent currents into the enclosure (well) is provided. (Sinha-OEIS)
W74-10587

BOOM ARRANGEMENT FOR CONFINING OIL,
G. Van't Hof.
U.S. Patent No 3,803,848, 5 p, 5 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 924, April 16, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, Water pollution control, Water quality control, *Pollution abatement, Equipment, Barriers.
Identifiers: *Booms.

A boom arrangement comprises a plurality of buoyant, bar-like parts elongated in a vertical direction and connected in side by side abutment in an elongated wall having a generally arcute plan. Several arcs may be connected to form a sinusoidal wall. The individual bar-like parts have a trapezoidal cross-section with non-parallel sides abutting in sets to form a series of arcs alternately concave towards opposite sides of the wall. A prestressing cable extending along the generally sinusoidal assembly provides rigidity, and means are provided for holding the parts in abutment. Several of such floating walls can be interconnected for surrounding, confining or sweeping a spill of oil or the like. An arcuate wall can be formed by interconnecting curved segments all facing in the same direction. (Sinha-OEIS)
W74-10591

ROUGH WATER BARRIER,
D. P. Hoult, and J. H. Milgram.
U.S. Patent No 3, 802,201, 6 p, 12 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 921, No 2, p 498, April 9, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water pollution control, Water quality control, Equipment, *Barriers.

The barrier for use in rough water to contain oil or flotsam includes a deformable barrier sheet disposed vertically in the water. Flotation elements are mounted so as to maintain the barrier generally perpendicular to the wave surface. Each flotation element includes two large diameter

cylindrical portions and a smaller diameter cylindrical portion. These portions are interconnected in a 'dumbbell' arrangement with the axis generally parallel to the local surface of the water. It was found that the 'dumbbell' shape has a lower apparent mass in heave than a straight cylinder of the same maximum diameter and length, the better to follow the waves. The barrier curtain is provided with a series of rigid reinforced or supporting elements in the form of reinforced fiberglass strips extending from the top to the bottom of the curtain. The flotation elements are attached at right angles to the fiberglass strips. (Sinha-OEIS)
W74-10595

A STUDY OF DIISOPROPYLGUANIDINE AND DIISOPROPYLGUANIDINE HYDROCHLORIDE TO DETERMINE THEIR HYGIENIC LEVELS IN WATER BODIES, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Epidemiologii i Mikrobiologii, Lvov (USSR).
For primary bibliographic entry see Field 5C.
W74-10598

A METHODOLOGY FOR POWER PLANT SITE SELECTION AT THE RECONNAISSANCE LEVEL,
Long Island Lighting Co., Mineola, N.Y. Environmental Engineering Dept.
For primary bibliographic entry see Field 6G.
W74-10602

WATER POLLUTION BEING FOUGHT BY COMPUTER.
The American City, Vol 89, No 5, p 71-72, May, 1974.

Descriptors: *Model studies, *Water quality control, Rivers, *Ohio, Simulation, Municipal wastes, Industrial wastes, Costs, Flow, Pollution, Effluents, Conservation, *Data collections, Treatment facilities.
Identifiers: River use, *Miami Conservancy District(Ohio), *Dayton(Ohio).

The Miami Conservancy District of Dayton, Ohio is collecting massive data on river use to determine factors that influence water quality. By using the data given the computer, both real and projected conditions can be simulated and forecast. The costs of the program are distributed among 20 municipal and county treatment plants, 15 paper mills, 20 other industries, 5 power plants and 5 counties, in proportion to how much they discharge into the river. Each engineer of the district collects statistical reports on flow or pollution conditions, with which other factors--such as influent or effluent rates--may be compared. (Prague-FIRL)
W74-10610

MARITIME ACCIDENTAL SPILL RISK ANALYSIS: PHASE I: METHODOLOGY DEVELOPMENT AND PLANNING,
Operations Research, Inc., Silver Spring, Md.
For primary bibliographic entry see Field 5B.
W74-10619

ULTRAFILTRATION CONCEPT FOR SEPARATING OIL FROM WATER,
Abcor, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5D.
W74-10620

PLANNING, EQUIPMENT AND TRAINING FOR OIL POLLUTION CONTROL,
M. F. Smith, and P. Lane.
Published by Speed Offset Printing Inc for Slickbar, Inc., Westport, Connecticut, Rev. editor 1973. 105p.

Descriptors: *Oil spills, *Water pollution control, Oily water, Oil pollution, Water pollution treatment, Planning.

A manual of common facts and procedures is presented for use by the oil spill control technician, as a guide to planning ahead for and recovering oil spills. This manual is directed at everyday spills which occur as the result of the day to day handling of petroleum products and chemicals. These are the spills that can be planned for in advance. (Knapp-USGS)
W74-10621

REGIONAL LANDFILL AND CONSTRUCTION MATERIAL NEEDS IN TERMS OF DREDGED MATERIAL CHARACTERISTICS AND AVAILABILITY: VOLUME I: MAIN TEXT; VOLUME II: APPENDIXES,
Green Associates, Inc., Towson, Md.
R. Reikenis, V. Elias, and E. F. Drabkowski.
Army Engineer Waterways Experiment Station Dredged Material Research Program Contract Report D-74-2, May 1974. 526 p, (Vol I-268 p; vol II-258p). 7 fig, 8 plate, 7 tab, 138 ref. Army Contract DACW 39-73-C-0141.

Descriptors: *Landfills, *Dredging, *Construction materials, *Sands, *Earth materials, Spoil banks, Surveys.

A survey was made of the regional needs for landfill and construction material which might be satisfied by using dredging spoils. Such needs vary substantially due to population shifts and economic growth of specific regions. Generally regional needs are substantially in excess of available volumes of dredged material, particularly in low-lying coastal areas. There are problems to overcome before dredged material is accepted for such usage. Given the projected quantities of dredged material, there can be large-scale disposal of dredged material on land sites. If these projects are planned and executed on a fixed time scale with well-integrated Government and private sector planning, desirable solutions to the dredged material disposal problem can be achieved. A detailed inventory should be made of all identified future development projects with regional development maps that show anticipated long-range needs of fill materials. Methodologies are needed for selection and acceptance of sites for disposal and stockpiling of dredged material. Techniques should be developed for placing, control, and dewatering of fine-grained hydraulic fill material to decrease time of consolidation. The most economical application of present techniques for disposal of dredged material and development of new techniques should be studied. (Knapp-USGS)
W74-10624

PRACTICES AND PROBLEMS IN THE CONFINEMENT OF DREDGED MATERIAL IN CORPS OF ENGINEERS PROJECTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 5E.
W74-10665

SEA WATER SYSTEM FOR AQUACULTURE OF ESTUARINE ORGANISMS AT THE SKIDAWAY INSTITUTE OF OCEANOGRAPHY,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5D.
W74-10670

FIDELITY OF INFORMATION TRANSMISSION IN LOCAL CAMPAIGNS ON WATER ISSUES,
Illinois Univ., Urbana. Dept. of Agricultural Economics and Sociology.
For primary bibliographic entry see Field 6B.
W74-10690

EVALUATION OF PROTOTYPE CRUSHED LIMESTONE BARRIERS FOR THE NEUTRALIZATION OF ACIDIC STREAMS,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
F. H. Pearson, and A. J. McDonnell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 551, $4.50 in paper copy, $2.25 in microfiche. Pennsylvania Institute For Research on Land and Water Resources, University Park, Research Publication No. 80, June 1974. 101 p, 24 fig, 25 tab, 33 ref, 6 append. OWRR A-030-PA(2). 14-31-0001-3838.

Descriptors: *Limestones, *Barriers, *Acidic water, *Mine drainage, Mathematical model, Hydraulics, Clays, Ions, Aluminum, Iron, Water quality, *Neutralization, *Hydrogen ion concentration, Kinetics, Chemical reactions, Design, Forecasting, *Waste water treatment, Water quality control.

At four prototype limestone barriers that had been constructed to neutralize acidic streams, water samples were taken for analysis, and measurements were made to determine the effect of each installation on water quality. The pH of stream water was increased by up to 3 pH units at low streamflow, to pH 7 or above. This demonstrates that limestone barriers are capable of renovating acidic streams to the point that normal aquatic life can be restored, rendering the stream water suitable for a number of uses that are otherwise precluded. A mathematical model of limestone barriers was constructed, based on hydraulic laws and on the chemical kinetics of the rate-limiting reactions between crushed limestone and acidic water. Model predictions matched the observed performance of the barriers, after some parameters of field conditions had been evaluated from field data. The most significant parameter describes the effect on the reactivity of limestone of the coating of clay, or of hydroxides of iron and aluminum from mine drainage, that form on limestone in streams. A simple design procedure was developed to rapidly determine the quantity of crushed limestone required to neutralize a given streamflow to any required degree, the rate of consumption of limestone in the acidic water, and the conditions for avoiding either washout of the barrier in floods, or clogging of the limestone by sediment. (See also W74-10694)
W74-10693

NEUTRALIZATION OF ACIDIC WASTES BY CRUSHED LIMESTONE,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
F. H. Pearson, and A. J. McDonnell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 549, $5.00 in paper copy, $2.25 in microfiche. Pennsylvania Institute for Research on Land and Water Resources, University Park, Research Publication No. 79, June 1974. 157 p, 48 fig, 30 tab, 27 ref, 10 append. OWRR A-030-PA(1). 14-31-0001-3838.

Descriptors: *Limestones, *Acidic water, *Neutralization, *Alkalinity, Acidity, Calcium carbonate, Carbon dioxide, Temperature, Turbulence, *Hydrogen ion concentration, Kinetics, Chemical reactions, *Waste water treatment, Water quality control.
Identifiers: Exsolution, Ionic strength, Hydrogen ions, Crushed limestone.

Experiments conducted to determine the reactivity of crushed limestone in acidic water were designed primarily to simulate the neutralization of acidic streams by barriers of crushed limestone, although the results obtained appear to be more widely applicable. Acidified water, at pH values ranging from 2 to 7, was circulated over crushed limestone in the size range 2-1/2 to 4 inches. Water samples were withdrawn periodically for determination of alkalinity and acidity, from which the kinetics of the two slower chemical reactions that

limit the overall process could be determined. These are the reaction between hydrogen ions and solid calcium carbonate, and the exsolution of carbon dioxide. For each of these reactions the dependence of the rate constant on temperature, ionic strength, and water turbulence was established; also the reaction between hydrogen ions and calcium carbonate appeared to be catalyzed by bicarbonate. Two linked differential equations were derived, that govern the decrease in the concentration of hydrogen ions and the balance of carbonic species as neutralization proceeds. These equations were solved simultaneously to obtain a description of the neutralization process, that reproduced experimental results. The pH of water in contact with crushed limestone is controlled by the reaction between hydrogen ions and limestone while mineral acidity is present, but the exsolution of carbon dioxide becomes increasingly significant where the pH is above about 5. (See also W74-10693)
W74-10694

PRACTICES IN DETENTION OF URBAN STORMWATER RUNOFF,
Poertner (Herbert G.), Bolingbrook, Ill.
For primary bibliographic entry see Field 4A.
W74-10696

THERMAL POLLUTION--A GROWING CONCERN,
Michigan Dept. of Natural Resources, Lansing.
C. D. Harris.
Michigan Natural Resources, p 20-25, May/June, 1969. 2 illus.

Descriptors: *Thermal pollution, *Nuclear powerplants, *Regulation, *Water policy, *Michigan, Water pollution, Water pollution sources, Water temperature, Great Lakes, Water cooling, Electric power production, Aquatic environment, Water law, Bodies of water, Governments, Water quality control, Heated water, Water quality standards.
Identifiers: Administrative regulations.

While nuclear power generating plants may well be the answer to man's rapidly growing demand for electric power, this solution creates problems of its own. 'Thermal pollution' is one of these problems. All nuclear plants now operating or being developed in the U.S. will be located on natural bodies of water and will use these waters for cooling. There presently are many uncertainties regarding the effect of returning the heated water to its source. Conservationists point out that radical biological changes result from even small variations in the average temperature of lakes or streams. Returning the heated water to the lake or stream may have a detrimental effect upon the fish and other aquatic life present there. To protect against possible adverse effects of thermal discharge, there should be close governmental supervision of all nuclear power plants. If these effects prove significantly harmful, the government should require the plants to shut down or turn to alternate methods of cooling, such as cooling towers or large man-made lakes. (Deckert-Florida)
W74-10698

FRENCH LAW AND THE POLICY TOWARD POLLUTION IN THE MEDITERRANEAN,
For primary bibliographic entry see Field 6E.
W74-10700

THE JAPANESE LEGAL APPROACH TO MARINE POLLUTION,
For primary bibliographic entry see Field 6E.
W74-10702

THE NEW LAW ON OCEAN DUMPING, STATUTE AND TREATY,
R. J. McManus.
Oceans, Vol 6, p 25-33, September/October, 1973.

Descriptors: *Legislation, *Treaties, *International law, *Oceans, *Waste disposal, Rivers, Water pollution sources, Water conservation, Economic aspects, Political aspects, Environmental sanitation, Ecology, Water pollution control, Regulation, United States, Monitoring, Ships, Oily wastes, Pollutants, Wastes, Water quality, International waters.
Identifiers: *Administrative regulations, Hazardous substances(Pollution).

The enactment of the Federal Marine Protection Research and Sanctuaries Act of 1972, and the enactment of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter are discussed. The United States has hoped that other countries would establish environmental protection regulations, but if they do not, foreign industry may gain a competitive edge since the price of their products will not reflect the cost of pollution abatement. Once the enactment of domestic ocean dumping legislation was foreseen, the United States became instrumental in establishing an international control mechanism. Neither the Act nor the treaty deal with operating discharges of ships, but with deliberate disposals at sea. Neither will affect the placing of scientific or defense monitoring devices nor will they affect the sinking of ships for fish habitats. The Act and treaty may be of little consequence as it has been estimated that ninety percent of the pollutants in the ocean get there via polluted rivers or fallout and while much of the remaining ten percent is oil, only a minuscule proportion comes from ocean dumping. (Sperling-Florida)
W74-10707

AMENDMENT OF THE OIL POLLUTION ACT, 1961, (15 STAT. 402), (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Coast Guard, Washington, D.C.
Available from National Technical Information Service, Springfield, Va 22161 as EIS-AA-73-0703-F, $4.50 in paper copy. April 1973. 63 p, 3 fig, 5 tab.

Descriptors: *Oil pollution, *Pollution abatement, *Environmental effects, *Oil spills, Penalties(Legal), Navigable waters, Legislation, Oil, Water, Oil wastes, Oil pollution, Water pollution control, Water pollution effects, Oceans, Sea water, Navigation, Banks, Water pollution sources, Storage tanks, Federal government, International law, Treaties, Coast Guard regulations, Legal aspects, Water law, Pollutants.
Identifiers: Environmental Impact Statements.

The Amendment to the Oil Pollution Act of 1961 incorporated the 1969 and 1971 Amendments to the International Convention for the Prevention of the Pollution of the Sea by Oil. Provisions of the 1961 Act, which forbids oily discharges by certain large vessels within prohibited zones, are compared to the amendment, which prohibits oily discharges anywhere unless delineated conditions are met. The amendment also provides for stronger penalties and oil record book requirements. The probable impact of the amendment is described. The principal sources of oil pollution, tank cleaning operations, vessel casualties, discharge from bilge pumping, and spills during cargo handling are discussed. In order to meet total discharge limitations and instantaneous rate of discharge limitations set by the amendment, vessels will need to retain dirty ballast and tank washings which will create a demand for oily residue reception facilities, convert to a 'load on top' system, or segregate ballasts. The latter requirement will require an increase in voyages or the number of vessels needed to carry a given quantity. The amendment will increase the cost of shipping, but is the most viable alternative for preventing the adverse effects of oil pollution. (Hunter-Florida)
W74-10708

THE NATIONAL WATER PERMIT PROGRAM.
Environmental Protection Agency, Washington, D.C. Office of Enforcement and General Counsel.
June 1, 1973. 28 p.

Descriptors: *Water quality control, *Federal Water Pollution Control Act, *Permits, *Water pollution control, *Legislation, Water quality, Water pollution, Effluents, Federal government, Administrative agencies, Legal aspects, Regulation, Water pollution treatment, Water pollution sources, Wildlife conservation, Fish conservation, Pollution abatement, Rivers and Harbors Act, Water quality standards.
Identifiers: FWPCA Amendments of 1972, Environmental Protection Agency(EPA).

One major feature of the sweeping Federal Water Pollution Control Act Amendments of 1972 was the establishment of a new national permit system. The Environmental Protection Agency (EPA) has published this summary of the main features of the permit system in order to inform the public. Included are the principal aspects of the statute itself, important regulations and guidelines which have been promulgated or are being developed, and major policy directives issued by the EPA. The background of the program is described, including relationships to the Refuse Act Permit Program, and other factual information concerning the scope of the program and the manner of its implementation is included. The Administrator of EPA will issue permits in early phases of the program until states apply for and receive either interim authorization or approval of their permit programs. Generally, by 1977, permits are to be issued with effluent limitations which represent the application of the best practicable control technology currently available. By 1983, effluent requirements must be met which represent the best available technology economically achievable. Publicly owned treatment works are given more lenient standards. In addition to best technology standards, water quality standards must also be met. (Hunter-Florida)
W74-10709

WATER QUALITY AND OUR FUTURE ENVIRONMENT -- A FEDERATION VIEW,
Duncan, Lagnese, and Associates, Inc., Pittsburgh, Pa.
J. F. Lagnese, Jr., and B. G. Rogers.
Journal Water Pollution Control Federation, Vol 45, No 1, p 4-9, January, 1973.

Descriptors: *Governmental interrelations, *Government finance, *Resource allocation, *Facilities, *Decision making, Water quality control, Manpower, Research and development, Funding, Resources, State governments, Comprehensive planning, Future planning(Projected), Administration, Administrative decisions, Economics, Education, Leadership, Operations research, Political aspects, Social aspects, Public benefits, Federal government, United States.

In considering water quality for the future, factors significantly affecting the administrative and legislative evolution of water management must be identified and analyzed. Four factors are of prime importance: public influence, federal legislative processes, the operation and construction of facilities, and basic research. Public influence up to the present has amounted to pressures by competing interest groups. Any assessment must balance the conflicting demands of the groups for jobs, allocation of funds for other programs, and all the other interests which compete with water management for governmental consideration. The process of federal legislation and the need for federal-state cooperation must also be considered. A policy change should be made to make water management a national rather than a purely federal goal. The federal government must maintain leadership through legislation, but should encourage state participation. Finally, the current interest in constructing new water purification facilities must not

be allowed to overshadow the importance of basic research and development of more efficient operation of existing facilities. In general, the future of water management will require greater political sophistication as well as increasing technical expertise. (Salley-Florida)
W74-10710

URBAN CREEKS, A CONDITION OF CRISIS.
Nine-Mile Creek Citizens Committee, Saint Paul, Minn.
The Minnesota Volunteer, p 1-6, March-April, 1971. 4 illus.

Descriptors: *Watershed management, *Land development, *Flood plain zoning, *Urbanization, *Urban hydrology, Watershed(Basins), Cities, Land use, Water resources development, Governmental interrelations, Regulation, Water policy, Small watersheds, Regional development, *Minnesota, Great Plains, Regional analysis, Comprehensive planning, Degradation(Stream), Political aspects.
Identifiers: Urban creeks.

Urban creeks, like the Nine Mile Creek which runs through Edina and Bloomington, Minnesota, illustrate some of the problems created by the rapid and uncontrolled urbanization of a watershed. There are two major obstacles to controlling the development of a watershed. First, many watersheds span several independent governmental units. Second, there is tremendous economic and political pressure opposing efforts to restrain growth. Any changes to this system to safeguard the urban creeks would require a governmental structure which is accessible to the citizens and which clearly delineates authority and political responsibility. Planning must be implemented consistently from one community to another. Communication must be open between agencies to promote inter-agency cooperation. A plan for state and federal action is presented that urges the use of construction moratoriums, government acquisition of integral parts of the creeks, and strict control of development in other parts of the watershed, to save the urban creeks. (Deckert-Florida)
W74-10711

IT'S EVERYBODY LAKE,
Michigan Dept. of Natural Resources, Lansing.
R. McKee.
Michigan Natural Resources, p 22-25, November/December 1969. 3 illus.

Descriptors: *Lake Superior, *Mine wastes, *Water pollution sources, *Suspended solids, *Pollution abatement, Pollutant identification, Interstate, Water quality standards, Surface waters, Water policy, Water management, Mine water, Waste water, Toxicity, Chromium, Copper, Zinc, Sewage disposal, Fish conservation, Michigan, Pollution treatment, Adoption of practices, Administration.
Identifiers: *Federal-state cooperation.

The threat posed to Lake Superior by mining operations and refuse is considered by a joint state-federal conference implementing the Clean Waters Act. Mine tailings are predominantly sand and unrecoverable iron, but there are traces of many other metals. The mine representative points out that one major complaint of shoreline residents, a condition known as 'green water,' existed before the mining operation began. 'Green water' results from the diffusion of light by fine particles suspended in the water column. Beyond the particulate matter, drainage from tailings into the Lake poses severe problems by raising the amount of minerals, such as copper, zinc, and chromium. These elements are toxic to aquatic life under certain conditions. The risks to the Lake are unnecessary. A joint state-federal conference has been arranged which has appointed a technical committee to study the water quality of the Lake and offer recommendations to maintain it, and has requested mine officials to undertake engineering studies to determine ways and means of reducing their discharges into the Lake. In addition each of the three states bordering the Lake is to establish new municipal sewage control programs. (Salley-Florida)
W74-10712

REPORT TO THE CONGRESS--WATER POLLUTION ABATEMENT PROGRAM: ASSESSMENT OF FEDERAL AND STATE ENFORCEMENT EFFORTS, ENVIRONMENTAL PROTECTION AGENCY.
Comptroller General of the United States, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10715

POLLUTION CONTROL IN ILLINOIS, THE FORMATIVE YEARS,
Illinois Pollution Control Board, Springfield.
S. N. Klein.
De Paul Law Review, Vol 22, p 759-778, 1972-73. 80 ref.

Descriptors: *Illinois, *Legislation, *Water pollution control, *Water quality standards, *Effluents, *State governments, Legal aspects, Regulation, Water pollution, Water policy, Waste water treatment, Sewage treatment, Sewage effluents, Discharge(Water), Administrative agencies, Administration, Pollution abatement, Water quality, Planning, Environment, Environmental effects.

Several key provisions of the Illinois Environmental Protection Act of 1970, some fundamental principles and precedents established by the Illinois Pollution Control Board, and the major problem areas which have confronted that agency in its formative years are examined. The Act turned a haphazard program to protect the environment into an innovative, effective program covering all aspects of pollution control. Three different agencies were established, each will authority over the entire field of pollution control. In the field of water pollution, the Pollution Control Board established a comprehensive, two-pronged regulatory program. The water quality standards are designed to protect entire streams and bodies of water, and the effluent standards cover a wide range of chemical constituents and are designed to force dischargers to capture harmful contaminants at the point of discharge. The combined effluent and water quality standards cover all discharges into Illinois waterways and provide a uniform, comprehensive and coherent statewide water pollution control plan. Other Illinois pollution problems and how the agencies deal with them are described. (Craig-Florida)
W74-10718

OILY BALLAST DISCHARGE - PROPOSED REQUIREMENTS.
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10719

CONSENT JUDGEMENTS IN ACTIONS TO ENJOIN DISCHARGES OF POLLUTANTS.
Department of Justice, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10720

MARITIME POLLUTION: THE CANADA SHIPPING ACT AMENDED.
University of British Columbia Law Review, Vol 8, No 1, p 197-204, 1973. 39 ref.

Descriptors: *Legislation, *International law, *Canada, *Legal aspects, *Water pollution sources, *Boats, Navigation, Economic aspects, Environmental sanitation, Water pollution control, Water law, Political aspects, Public health, Cost allocation, Water pollution, Water conservation, Coasts, Shorelines, Admiralty, Ecology, Environmental effects.
Identifiers: Coastal waters, Hazardous substances(Pollution).

Canada has adopted legislation to govern and control the threat of marine pollution, particularly in coastal waters. This legislation, the Canada Shipping Act, was intended to provide measures whereby pollution would be prevented as well as to insure adequate remedies for compensation, however it may have little application to the majority of pollution incidents which occur on the coasts. Amendments to the Act made polluters civilly liable for pollution damage both to the government and to private interests. The Act imposes liability on the shipowner and the owner of the pollutant, regardless of fault. There are three exceptions to this general liability. If the pollutant was discharged by an act of war or of God, the intentional act of an independent third party, or due to negligence in the operation or maintenance of aids to navigation, liability will not attach. The ship or cargo owners may seek indemnity from third parties. There is strict, though limited liability, for the shipowner in a pollution incident attributable to his vessel. (Sperling-Florida)
W74-10721

LOCAL INITIATIVE IN POLLUTION CONTROL,
Environmental Protection Agency, Washington, D.C.
W. D. Ruckelshaus.
Journal of the Water Pollution Control Federation, Vol 45, No 1, p 1-3, January 1973.

Descriptors: *Governmental interrelations, *State governments, *Local governments, *Water pollution control, *Pollution abatement, *Federal Water Pollution Control Act, Water quality control, Water quality, Projects, Federal project policy, Cost repayment, Grants, Financing, Interstate, Decision-making, Administration, Permits.

State participation in pollution control and state co-operation with federal pollution control efforts are needed badly. Proposed is the establishment of a working group of state elected representatives, one from each of the Environmental Protection Agency's (EPA) 10 regions, to work with EPA in devising an effective way in which to clean up the nation. The members of this group would be officials responsible for implementing state programs and inserting state viewpoints at the early stages of EPA decision making. One of the prime objectives of the proposed program would be to strengthen state environmental programs largely through federal grants to state and interstate agencies. Another objective is to provide federal-state teamwork in evaluation the thousands of individual plants across the nation in light of EPA permit guidelines for determining best practicable control technology. The program would also eliminate duplicated efforts in state permit programs and federal permit programs. Several states are sharing with their EPA regional headquarters the responsibility for certification of review of federally assisted projects; this practice, which reduces processing time, is encouraged. (Hunter-Florida)
W74-10722

A BILL TO PROMOTE COMMERCE AND PROTECT THE ENVIRONMENT BY ESTABLISHING PROCEDURES FOR THE SITING, CONSTRUCTION, AND OPERATION OF DEEP-WATER PORT FACILITIES OFF THE COAST OF THE UNITED STATES, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W74-10723

ANALYSIS OF POLLUTANTS - PROPOSED TEST PROCEDURES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-10725

THAT WASTE DISPOSAL PROBLEM,
Minnesota Univ., Minneapolis. Agriculture Extension Service.
For primary bibliographic entry see Field 5D.
W74-10726

UNITED STATES V. BOYD (PROSECUTION OF SHIP CAPTAIN FOR FAILURE TO REPORT OIL DISCHARGE).
For primary bibliographic entry see Field 6E.
W74-10727

STATE V. MCFARREN (ACTION TO REQUIRE LANDOWNER TO REMOVE FILL DEPOSITED IN A NAVIGABLE LAKE).
For primary bibliographic entry see Field 6E.
W74-10728

DESCRIPTION OF STATE OF GEORGIA'S PROPOSED NPDES PROGRAM.
Manuscript, 1974. 24 p, 3 tab, 2 fig.

Descriptors: *Georgia, *State governments, *Administrative agencies, *Adoption of practices, *Coordination, Decision making, Legislation, Personnel management, Planning, Water management(Applied), Permits, Administrative decisions, Manpower, Training, Employees, Engineering personnel, Professional personnel, Operations research, Water law, Water policy.

The program by which the state of Georgia will carry out the National Pollutant Discharge Elimination System (NPDES) is discussed. An Environmental Protection Division is to be created by the state legislature and will be composed of six sub-agencies: the Industrial Waste Service, the Municipal Engineering Service, the Private and Institutional Development Service, the Training and Grants Service, the Water Quality Service, and the Laboratory Services Unit. The membership of the agencies, funding, and manpower requirements are delineated as well as the training or experience levels required for each position. Procedures are set out for reporting and for public notice to allow participation by the public in hearings on controversial issues. Flow charts diagram the process from application for a permit, through the hearing stage, and to a decision and appeal. The mechanics and framework of the Georgia NPDES agency are described. (Salley-Florida)
W74-10731

MARINE RESOURCES -- A NATIONAL PERSPECTIVE,
National Oceanic and Atmospheric Administration, Washington, D.C. Office of Coastal Environment.
For primary bibliographic entry see Field 6E.
W74-10732

PLAYING TO WIN IN THE DRAINAGE GAME,
For primary bibliographic entry see Field 6E.
W74-10733

A GAME PLAN FOR WATER RESOURCES,
Minnesota Dept. of Natural Resources, Saint Paul.
For primary bibliographic entry see Field 6E.
W74-10734

(DEATH OF A POND. DEATH OF A RIVER. THE SOUND AND FURY).
The Minnesota Volunteer, p 38-47, July-August, 1971. 7 illus.

Descriptors: *Wetlands, *Environmental effects, *Drainage, *Drainage effects, *Administrative agencies, Drainage programs, Ditches, Flood plains, Ecology, Soil conservation, Channeling, Water policy, Water management(Applied), Water conservation, Land management, Erosion, River flow, River systems, Silting, Floods, Wildlife conservation, State governments, State jurisdiction, Federal government, Conservation, Adoption of practices, aquifers.
Identifiers: *Administrative regulations, *Channelization.

There are extensive programs in the U.S. to drain wetlands by channelling rivers and streams, by constructing drainage ditch systems and by clearing trees on flood plains. These practices reduce the capacity of a region or watershed to hold and store water. Dumping water downstream creates a chain reaction: floods, siltation from accelerated run-off, erosion, loss of aesthetic value, and destruction of fisheries, wildlife and other natural resources. Controversy rages between the Soil Conservation Service (SCS) and Corps of Engineers who implement these drainage programs, and the conservation agencies in many states. The public has been little concerned with the impact of drainage and channelization because drainage of vast acreage is not readily visible to the general public, the media has concentrated on more dramatic ecological disasters such as oil spills and air pollution, agricultural interests predominate over conservation interests in decision-making, and rival government agencies are reluctant to criticize SCS and the Corps. (Dillingham-Florida)
W74-10735

ECONOMIC IMPLICATIONS OF WATER POLLUTION ABATEMENT IN FAMILY FARM LIVESTOCK PRODUCTION,
Economic Research Service, Urbana, Ill. Farm Production Economics Div.
For primary bibliographic entry see Field 6E.
W74-10738

TEST OF A NEW MODEL FOR THE KINETICS OF ADSORPTION-DESORPTION PROCESSES,
Utah State Univ., Logan. Dept. of Soils and Biometeorology.
R. A. Griffin, and J. J. Jurinak.
Soil Science Society of America Proceedings, Vol 37, No 6, p 869-872, November-December, 1973. 5 fig, 1 tab, 8 ref.

Descriptors: *Nutrient removal, *Phosphates, *Adsorption, Thermodynamics, Mathematical models, Computer models, *Kinetics.
Identifiers: *Desorption.

A new model for the kinetics of adsorption-desorption processes proposed by Lindstrom, Haque, and Coshow (1970) was tested with adsorption and desorption data for the interaction of phosphate with the calcite mineral surface. The model was found to offer considerable advantages in speed and convenience to those users whose experimental conditions correspond to the assumptions inherent in the derivation of the model. There was reasonable agreement between the predicted adsorption kinetic parameters and experimental data. However, considerable disparity was observed between predicted and experimental desorption parameters. It was concluded that the model was not valid for endothermic processes. (Skogerboe-Colorado State)
W74-10742

SOIL AND WATER CONSERVATION RESEARCH: CHALLENGE FOR THE 70'S,
Agricultural Research Service, Beltsville, Md. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 3F.
W74-10750

PROCEEDINGS OF MEETING ON ENVIRONMENTAL POLLUTION (3RD) HELD AT FORT MCNAIR ON 17-18 MAY 1972, SPONSORED BY AMERICAN ORDNANCE ASSOCIATION.
Edgewood Arsenal, Aberdeen Proving Ground, Md.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-766 718 $5.50 in paper copy; $2.25 in microfiche. Report EASP 1300-3, August 1973. 231 p, 60 fig, 23 tab, 5 ref.

Descriptors: *Pollution abatement, *Air pollution, *Water pollution, *Military aspects, Jurisdiction, Wastes, International law, Ships, Oil spills, Aircraft hazards, Economics, Detergents, Land management, Herbicides, Pesticides, Fish, Wildlife, Recycling, Monitoring, Fuels, Sewage disposal, Garbage dumps, Coast Guard regulations, Estuaries, Legislation, Food chains, Design, Research and development, Pollutants, Delaware River, Illinois, Political aspects, Powerplants, Cooling towers, Sites.
Identifiers: *American Ordnance Association, Noise pollution, Navy, Air Force, Army, Environmental Protection Agency.

The environmental pollution problems, including air pollution, water pollution, and noise pollution, are discussed by representatives of the Army, Navy, Maritime Administration, and Coast Guard. The session dealt with pollution in the marine environment, pollution from domestic and industrial wastes, and pollution from power generation. Each agency has its specific problems and the specific nature of each environment requires special treatment. Oil spills, hazardous material spills, vessel protection, and ocean dumping are emphasized. Regionalization of megalopoli enhances pollution control as exemplified by the Delaware River Estuary. The Refuse Act Permit Program is described in connection with discharges to navigable waters without a permit from the Corps of Engineers. The regional Air Pollution Study, a five-year program of air pollution research, is elucidated. Special studies were made in St. Louis of regional air pollution control and of Chicago for waste water management. The power industry was discussed in connection with the Environmental Protection Agency's research and development program, the growth in power demand, the relation of water requirements for cooling and the significance of plant location, design, and operation. (See W74-10766 thru W74-10783) (Jones-Wisconsin)
W74-10765

THE MILITARY ATTACKS POLLUTION,
Office of the Deputy Assistant Secretary for Defense for Environmental Quality, Washington, D.C.
J. A. Busterud.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 17-21, 1973.

Descriptors: *Pollution abatement, *Water pollution control, *Air pollution, *Military aspects, Environment, Legislation, Jurisdication, Foreign countries, Conservation, Costs, Research and development, Hazards.
Identifiers: *Department of Defense, Army, Navy, Air Force.

The Department of Defense has the responsibility for providing leadership in developing techniques for identifying possible environmental imapcts in early planning stages and including environmental consideration into planning phases. An important role is supervision of the massive cleanup operation required by federal and state water, air, and solid-waste statutes and regulations. The DoF controls some 29,000,000 acres of real estate with a heavy responsibility for carrying out its stewardship sensitive to the preservation of natural resources. The DoF cooperates in providing

leadership to the international community in environmental fields. Identification of environmental pollution and coordination of research activities in connection with these problems is involved. Army pollution abatement programs are directed toward vehicle and mobile sources and Army aircraft, biomedical effects of noise and electromagnetic radiation, air, water, and solid-waste disposal, and construction and facility operations. Navy programs encompass ship pollution abatement, oil spills, and controls aircraft pollution, ordnance disposal, and development of a data base. The major programs of the Air Force are in aircraft and missile emissions and control, noise and sonic boom effects, electromagnetic effects, ground facility support, hazardous material handling, and evaluation and control of noxious effluents in the atmosphere. (See also W74-10765) (Jones-Wisconsin)
W74-10766

THE ARMY, ITS MILITARY ACTIVITIES, AND THE ENVIRONMENT DURING 1970,
Deputy Chief of Staff for Logistics (Army), Washington, D.C.
R. E. McConnell.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 23-61, 1973. 1 fig, 10 tab.

Descriptors: *Pollution abatement, *Military aspects, *Environment, *Planning, Ecology, Population, Economics, Air pollution, Water pollution, Ships, Oil, Detergents, Land management, Herbicides, Pesticides, Forest management, Fish management, Wildlife management, Solid wastes, Industrial wastes, Recycling, Sewage treatment, Monitoring, Operations, Fossil fuels, Construction equipment, Aircraft, Facilities, Radiation.
Identifiers: *Army, *Environatics, Noise pollution, Automotive equipment.

Environmental problems of Army installations can generally be treated in the same fashion as those in civilian areas. Army fiscal planning includes provisions for many projects relating to protection and enhancement of environmental quality. The Army will comply fully with both the requirement and the spirit of Executive Orders relative to prevention, control, and abatement of air and water pollution at federal facilities. Details of Army programs in environatics include discussion of air pollution (installations, automotive vehicles, ships, aircraft, construction equipment, materials-handling equipment, specifications for paints, varnishes and other volatile substances, unleaded gasoline); water pollution (installations, ships, oil, purchase of detergents); land management, conservation, herbicides and pesticides (general program and soil and water conservation, forest management program, fish and wildlife management program, post/camps/station operations); noise pollution (specific research and development work); thermal pollution; radiation pollution, solid waste (nonindustrial and industrial activities, recycling); toxic and hazardous materials; research and development activities and requirements; training programs; enhancement of the environment; and public information. These abatement programs, and more, are detailed as the Army's contribution to environmental pollution abatement. (See also W74-10765) (Jones-Wisconsin)
W74-10767

ENVIRONMENTAL LEGISLATION AND THE AIR FORCE,
Environmental Protection Agency, Washington, D.C.
C. M. Whitehead.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 63-65, 1973.

Descriptors: *Pollution abatement, *Military aspects, Facilities, Aircraft, Waste treatment, Air pollution, Fuels, Land use.
Identifiers: *Air Force, Noise abatement.

The Air Force will have spent almost $80 million for new facilities to combat water pollution at its installations in addition to approximately $160 million in facilities already in place. The work has involved upgrading and expansion of plant facilities for treating sanitary and industrial liquid wastes and related improvement to collection systems. The air pollution abatement program will amount to about $60 million in additional facilities construction, the major portion going into the conversion of heating plants from solid fuel to liquid and gaseous fuels. All Air Force actions are subjected to environmental assessment and are reviewed by the Command Environmental Protection Committees. The major aircraft emission problems are carbon monoxide and hydrocarbons at low power and nitrogen oxides and smoke at high power. Technology is or will be available in the near future to reduce smoke, carbon monoxide, and hydrocarbons. However, nitrogen oxide control is more difficult because the trend of engine development (compressor ratio, turbine inlet temperature) is in the direction of aggravating the problem. To address the runup problem the Air Force has spent about $25 million to procure and install sound suppressors. (See also W74-10765) (Jones-Wisconsin)
W74-10768

NAVAL ENVIRONMENTAL PROTECTION PROGRAM,
Office of the Chief of Naval Operations, Washington, D.C. Environmental Protection Div.
J. A. D'Emidio.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 66-83, 1973. 7 fig.

Descriptors: *Pollution abatement, Facilities, Harbors, Military aspects, Smoke, Air pollution, Solid wastes, Waste treatment, Oil spills, Waste disposal, Environment.
Identifiers: *U.S. Navy.

Fuels are subject to stringent particulate and sulfur oxide emission standards developed by local, state or federal agencies. Each year the Navy's pollution-abatement program proposal for the congressional budgets are reviewed by the Environmental Protection Agency to insure compliance with the 'standards' and to ascertain cooperation with state and local programs. The Navy's effort has been concentrated mainly in the two areas where the impact of pollution abatement is the greatest--shore facilities and ships. Though significantly less in magnitude, programs to control engine emissions from both vehicles and aircraft are also being vigorously pursued. One major effort presently underway is the reduction of smoke from ships' boilers. Naval Ships Systems Command is developing compactors, encapsulators, and incinerators for use aboard ships so that solid waste management can be practiced. Pernicious small spills in harbors caused by leaks, overflows through vent pipes on ships, parting of fuel lines during oil transfer and recovering operations, and human error are attacked by several measures. Deepwater dumping of ordnance has been stopped. (See also W74-10765) (Jones-Wisconsin)
W74-10769

MARITIME ADMINISTRATION POLLUTION ABATEMENT PROGRAM,
Maritime Administration, Washington, D.C., Office of Ship Construction.
E. S. Dillon.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C. p 85-92, 1973. 1 fig, 1 tab.

Descriptors: *Pollution abatement, *Navigation, Industries, Ships, International law, Oil pollution, Waste disposal, Smoke, Oily water, Oceans, Harbors, Regulation, Economic efficiency.
Identifiers: *Maritime Administration, Ballast, Offshore terminals, Maritime shipping, Tankers.

While smoke, garbage, and trash disposal have their obnoxious features, they can be coped with satisfactorily in most situations. Sewage and oily waste disposal, however, are problematic. Principal efforts are directed to their solution, with the greatest allocation of personnel and funding accorded to oil pollution. Work is carried on with the U.S. industry through the National Industrial Pollution Control Council for pollution abatement, with the aid from the American Institute for Merchant Shipping. The UN Subcommittee on Marine Pollution of the Intergovernmental Maritime Consultative Organization acts as a steering group and coordinator. The requirement to build all new tinkers with sufficient ballast tankage of clean salt water to prevent large amounts of oily ballast water from entering the sea should be implemented. IMCO asked the United States to conduct a similar study for product carriers, i.e., gasoline and kerosene. To obtain scientific knowledge of the fate and effects of oil in various concentrations and amounts entering open oceans, a long-range research project is underwritten. Even after years of attention to the problem, there is still no satisfactory program or set of regulations to guide shipbuilders and shipowners on ship sewage disposal. (See also W74-10765) (Jones-Wisconsin)
W74-10770

ROLE OF COAST GUARD IN POLLUTION CONTROL,
Coast Guard, Washington, D.C. Office of Marine Environment and Systems.
W. Benkert.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972. Fort McNair, Washington, D.C., p 93-95, 1973.

Descriptors: *Pollution abatement, *Coast Guard regulations, Ships, Oil pollution, Waste disposal, Sewage disposal, Law enforcement, Navigable waters, Regulation, Oceans.
Identifiers: Coast Guard.

The Coast Guard has pollution abatement problems similar to the Navy's only on a slightly smaller scale in vessels and shore-side establishments. The Coast Guard is the primary law-enforcement agency dealing with oil pollution in navigable waters and is directly involved in the problem of sewage pollution as soon as the Environmental Protection Agency promulgates their standards. All oil spills are investigated and they are responsible for insuring that the person who spills the oil cleans it up. They are also responsible for prevention in that, under the act, they are required to come up with regulatory action hopefully resulting in controlling accidental or deliberate oil spills. Oil pollution-prevention regulations have been developed; some aspects of these regulations apply to vessels; some to people who operate these vessels, some to the people responsible for the vessel's operation, and probably most important, some to the terminal-ship interface. Most spills occur during transfer of cargo from shore-site ships and vice versa. The Coast Guard has been in regulatory fields particularly appropriate to the Merchant Marine and has a close association with the operation and functioning of the Merchant Marine. (See also W74-10765) (Jones-Wisconsin)
W74-10771

OIL SPILLS, HAZARDOUS MATERIALS SPILLS, VESSEL PROTECTION, AND OCEAN DUMPING,
Edison Water Quality Lab., N.J.
R. Dewling.

In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972. Fort McNair, Washington, D.C., p 99-106, 1973.

Descriptors: *Pollution abatement, *Oil spills, *Chemicals, Ships, Oceans, Inland waterways, Estuaries, Technology, Ships, Legislation, Shores, Disasters, Monitoring, Boats, Toxins, Acids, Hazards.
Identifiers: *Hazardous materials.

The program conducted by the Edison Water Quality Laboratory of the EPA in connection with oil spills, hazardous material spills, and effluent from small recreational watercraft in inland waters and estuaries is described. The techniques for identifying oil, containment, removal, and beach restoration are being evaluated. Research programs are conducted to develop greater awareness of the effects of assiduous disposal of crankcase oil, the major pollution source, and techniques for restoring the waste product for reuse, and the effects of various oil products on aquatic life. The hazardous materials (most of which are water soluble) program is concerned with prevention, monitoring, and cleanup. The variability of toxic effects of the many chemical compounds, their effect on biological life, spill reporting and development of detection techniques, are more critical than they are for oil, especially from the public safety standpoint. The problems of counter-measures in hazardous materials spills and detoxification are discussed. The laboratory's aims are also in developing technology for meeting water quality standards for small recreational watercraft effluent, the problems of discharges from holding tanks in rural areas and small marinas, and treatment systems. The prognosis for eliminating oil discharges from outboard motors is good. (See also W74-10765) (Auen-Wisconsin)
W74-10772

THE COAST GUARD MARINE ENVIRONMENTAL PROTECTION PROGRAM,
Coast Guard, Washington, D.C. Marine Environmental Protection Div.
D. B. Charter, Jr.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972. Fort McNair, Washington, D.C., p 107-116, 1973.

Descriptors: *Pollution abatement, *Coast Guard regulations, Law enforcement, Navigable waters, Oil pollution, Ships, Water pollution control, Hazards, Water pollution effects, Legislation, Sewage disposal, Regulation, Oil pollution, United Nations, Research and development, Environmental effects.
Identifiers: *Coast Guard.

The Coast Guard has developed a progressive Marine Environmental Protection Program to help combat pollution and maintain a clean environment. The major elements of the program, prevention, impact, response and internal abatement, are designed to utilize best multimission resources and multidisciplinary Coast Guard expertise. This effort is supported with substantial engineering and research and development efforts. Polluting spills would be minimized with minimum effect on the ecological, aesthetic, recreation, economic and health aspects of the marine environment with undue curtailment or restraint of legitimate recreational and commercial usage of waterways. The vessel prevention activities include prevention of discharges of oil, hazardous substances and other materials, and control of vessel sewage. The Coast Guard is conducting regular shoreside and waterside patrols in major port areas to detect illicit spills. The impact assessment element of the program covers environmental impact considerations, and pollution research and investigations. When a discharge occurs, it is expected and encouraged that the person responsible will carry out removal. In addition to continued development of cleanup equipment for oil spills, work will be continued in developing special systems to abate routine sewage, solid waste, and exhaust emissions from vessels. (See also W74-10765) (Jones-Wisconsin)
W74-10773

RESEARCH AND DEVELOPMENT ON PREVENTION OF POLLUTION OF THE SEAS BY OIL AND OTHER POLLUTANTS,
Maritime Administration, Washington, D.C. Office of Research and Development.
J. Seelinger.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972. Fort McNair, Washington, D.C., p 117-126, 1973. 5 fig.

Descriptors: *Pollution abatement, *Research and development, *Oceans, *Oil pollution, International waters, Standards, Treaties, Ships, Facilities, Operations research, Water pollution control, Cost-benefit analysis.
Identifiers: *Maritime Administration.

The concern of the Maritime Administration research and development programs is only with prevention of both accidental and intentional oil discharges. Requirements of current oil discharge laws and standards are summarized. The U.S. position at the Intergovernmental Maritime Consultative Organization conference will probably be that segregated ballast fully meets the intent of 'complete elimination,' and the discharge of oily wastes which produce a sheen, sludge or emulsion should be prohibited on both the high seas and in territorial waters in an attempt to extend domestic policy on an international agreement basis. To approach the goal of complete elimination, no one alternative can be effective. Segregated ballast, for example, will not solve or accommodate when heavy weather requires taking on more ballast than segregated capacity allows; nor, and more significantly, does it eliminate oily wastes generated during the tank-cleaning process. Research activities are directed to develop and evaluate ship equipment, systems and operating practices, ship designs and shoreside facilities to enable pollution-free ship operation with minimum economic penalty to the maritime community. (See also W74-10765) (Jones-Wisconsin)
W74-10774

REGIONALIZATION IN THE DELAWARE RIVER ESTUARY,
Delaware River Basin Commission, Trenton, N.J. Water Quality Branch.
For primary bibliographic entry see Field 5D.
W74-10775

REFUSE ACT PERMIT PROGRAM,
Environmental Protection Agency, Washington, D.C. Office of Refuse Act Programs.
R. B. Schaffer.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution May 17-18, 1972. Fort McNair, Washington, D.C., p 145-149, 1973.

Descriptors: *Permits, *Effluents, *Navigable waters, Industrial wastes, Rivers and Harbors Act, State jurisdiction, Legislation, Social participation, Municipal wastes, Waste disposal.
Identifiers: *Refuse Act, Corps of Engineers.

Authority for the Refuse Act Permit Program is derived from Section 13 of the River and Harbor Act of 1899. In simple terms, it states that no discharges are allowed to navigable waters or their tributaries without a permit from the Corps of Engineers. The procedure for obtaining a permit is described. Technical review of permit applications generally takes place at the regional level. After extensive research and coordination with experts in the various industrial fields, the regions are provided with general guidance in the conditions to be imposed on the discharger. Evaluation of the permit applications is approached on an industry-by-industry basis by gathering the best available information on the processes used by a particular industry, and on the waste abatement practices available and/or commonly used by the industry. Then, the river basin to be affected by the discharger is considered. Passage of new legislation which would cause substantial changes in the scope and procedures of the program is anticipated. (See also W74-10765) (Jones-Wisconsin)
W74-10776

THE RAPS PROGRAM,
Environmental Protection Agency, Research Triangle Park, N.C. Chemistry and Physics Lab.
For primary bibliographic entry see Field 5A.
W74-10777

REGIONAL WASTEWATER MANAGEMENT SYSTEMS FOR THE CHICAGO METROPOLITAN AREA,
Corps of Engineers, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-10778

U.S. ARMY ENVIRONMENTAL QUALITY RESEARCH AND DEVELOPMENT PROGRAMS,
Army Research Office, Arlington, Va. Life Sciences Div.
J. L. Gregg.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution May 17-18, 1972. Fort McNair, Washington, D.C., p 177-182, 1973. 7 fig.

Descriptors: *Pollution abatement, *Research and development, *Military aspects, Air pollution, Water pollution, Industrial plants, Construction, Biodegradation, Waste water treatment, Recycling, Facilities.
Identifiers: *Army, Army materiel, Emission control.

The Army's pollution problems reflect those of the civilian community although it has its own set of unique pollution problems as well. For example, there are many problems arising from the manufacture, handling, and demilitarization of munitions which have no counterpart in the civilian community. Development of military materiel requires constant assessment of the polluting potential of each item to ensure that emissions produced during testing, manufacturing, operation, maintenance, and final disposal are minimized consistent with operational requirements. There are a substantial number of problems associated with Army industrial facilities and military construction activities which must be addressed in toto by their own program. Army Materiel Command, being the industrial manager for the Army, is confronted with pollution problems as diverse as Army materiel itself. The Army's R and D effort in the area of environmental quality enhancement is comprehensive and responsive to its problems. It is sufficiently farsighted to assist the Army materially in its goal to minimize both short-term and long-term adverse environmental impacts associated with its operations. It will continue to lean upon industry and the civilian academic community for assistance in this area. (See also W74-10765) (Jones-Wisconsin)
W74-10779

AIR FORCE ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM,
D. G. Silva.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution May 17-18, 1972. Fort McNair, Washington, D.C., p 183-200, 1973. 19 fig.

Descriptors: *Pollution abatement, *Research and development, Air pollution, Water pollution, Solids wastes, Aircraft, Technology, Photography, Waste water treatment, Waste disposal, Birds, Smoke, Metallurgy.
Identifiers: *Air Force, Photographic wastes, Emissions.

The research responsibility of the Air Force is currently being carried out by the Environics Branch of the Civil Engineering Research Division, divided into Air Resources, Water Resources, Solid Waste, and Ecosystems Technology Sections. A research project currently being conducted by the Air Resources Section is investigation into proper operation of jet engine test cells to prevent air pollution. Another maintenance operation found to be a potential polluter is replating operations. Another related project of the Water Resources Section is investigation of treatment methods to prevent environmental pollution from photographic development processes. Research is conducted in water and wastewater treatment facilities. An in-house evaluation is being made of a water filter of fused diatomaceous earth. The Solid Waste Section is currently investigating several Air Force problem areas, one of which is destruction of classified material including film. Air Force practices with solid waste are being investigated. Study is made of bird-aircraft strikes, and a technique to reduce the smoke emissions released during crash-rescue training fires. Another program, conducted at the laboratory, cuts across all the research disciplines--collection of Air Force pollution emission factors. (See also W74-10765) (Jones-Wisconsin)
W74-10780

THE EPA RESEARCH AND DEVELOPMENT PROGRAM FOR ENVIRONMENTAL CONTROLS IN THE POWER INDUSTRY,
Environmental Protection Agency, Washington, D.C. Industrial Pollution Control Section.
G. Rey, G. Manning, and F. Rainwater.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 203-213, 1973. 1 fig, 3 tab.

Descriptors: *Pollution abatement, *Research and development, *Electric power industry, Grants, Water pollution control, Recycling, Legislation, Water requirements, Technology, Management, Water reuse, Cooling water, Waste water treatment, Thermal pollution.
Identifiers: *Environmental Protection Agency, Demonstration projects.

The Environmental Protection Agency has developed a program for water pollution control for the power industry consisting of research, engineering and development, and demonstration. It is hoped that it will indicate areas of mutual and potential participation and cooperation by and between the federal, state, municipal, and industrial communities. The program allows for the demonstration of new technology to show decision makers that new and improved methods are available. Industry may participate in grant programs to develop and demonstrate new or improved methods of treating waste or otherwise preventing pollution and which method shall have industry-wide application. Authorized grants may not exceed 70% of the project cost, and are limited to a maximum of $1 million. It is imperative that methods for water and wastewater management be developed where necessary by the power industry in conjunction with municipalities. The cost of all water handling, and water availability are becoming vital parts of the power industry's economics thus some industries are now considering use of sewage treatment plant effluent as makeup for cooling water; others are innovating intensive programs of internal use abatement, multiple use, and recycle to attain 90-99% reduction in effluent discharges, and hence, intake volume. (See also W74-10765) (Auen-Wisconsin)
W74-10781

SOME ENVIRONMENTAL CONSIDERATIONS IN POWER GENERATION,
Burns and Roe, Inc., Oradell, N.J.
K. A. Roe.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 215-224, 1973. 5 fig, 1 tab.

Descriptors: *Environmental effects, *Thermal powerplants, *Sites, Heat transfer, Heat, Cooling, Economics, Aquiculture, Beneficial use, Agriculture, Regional analysis, Permits, Planning.

Within two decades we will have to build at least 250 huge new power generating stations across the country on sites containing at least several hundred acres. One to two billion dollars investment will be involved and will take five to eight years or more to design and construct. Among the principal factors affecting site selection are topography, subsurface conditions, site accessibility by road, rail and water, location of load centers, proximity to transmission grid, fuel supply, and cooling water supply. Currently, the most favored methods of dissipating heat from thermal power plants are once-through cooling systems, man-made cooling lakes, spray ponds and wet (evaporative) cooling towers. Dry (non-evaporative) cooling towers, salt water cooling towers and salt water ponds are under consideration primarily in areas where fresh water makeup is unavailable for evaporative cooling. More regional planning and organizations to resolve questions which cross state lines are necessary if the complex environmental and licensing issues facing the power industry are to be effectively solved and in a timely manner. These regional groups should consider beneficial use of heat, such as to support aquaculture, agriculture, and recreation. (See also W74-10765) (Jones-Wisconsin)
W74-10782

POWER PLANT SITING PROGRAM,
Maryland Dept. of Natural Resources, Annapolis.
L. E. Zeni.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 225-231, 1973.

Descriptors: *Electric powerplants, *Sites, *Legislation, *Decision making, Environmental effects, Air pollution, Nuclear powerplants, Maryland, State governments, Thermal pollution, Chesapeake Bay, Evaluation, Financing, Future planning(Projected), Monitoring.

In anticipation of a tripling of U.S. electricity consumption by 1990 and the consequent environmental effects, Maryland has enacted legislation creating a state power plant siting program which contains a number of innovative features. The electric utilities and the Maryland Public Service Commission are directed to engage in long-range planning to develop forecasts for electric demand and supply and proposed power plant sites for at least ten years. The Department of Natural Resources must prepare preliminary environmental impact statements sufficient to estimate the environmental impact of each proposed location, to be investigated in detail. To provide scientific and technical information relevant to site evaluation and decision, the state is committed to a comprehensive, multiply-funded research and monitoring program intended to involve human, institutional, and financial resources of the private sector, and local, state and federal government in long-range, suitably-funded, well-designed electric power plant environmental research programs financed by the Environmental Trust Fund; a revolving fund generated by a surcharge on electricity produced within the state. The Public Service Commission is to grant or deny permits. The law's intent is to insure public knowledge of all information relevant to siting power plants and to provide opportunities for the public's participation. (See also W74-10765) (Auen-Wisconsin)
W74-10783

ELIMINATION OF PHOSPHATE DETERGENTS AND PSYCHOLOGICAL REACTANCE,
Florida Univ., Gainesville. Dept. of Marketing.
For primary bibliographic entry see Field 5C.
W74-10798

PIPE INSPECTION CAMERAS AND TECHNIQUES,
Photo Data Inst., Janesville, Wis.
For primary bibliographic entry see Field 8G.
W74-10828

TOXIC EFFECTS OF FRESHWATER TURBELLARIANS ON SCHISTOSOME MIRACIDIA,
Cincinnati Univ., Ohio. Dept. of Biological Science.
For primary bibliographic entry see Field 5C.
W74-10830

JET PUMP STOPS SAND CLOGGING,
Williston Water Dept., N. Dak.
For primary bibliographic entry see Field 8C.
W74-10831

AMENDED BILL: IMPLEMENTATION OF CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING WASTES AND OTHER MATTER.
Committee on Merchant Marine and Fisheries (U.S. House).
For primary bibliographic entry see Field 6E.
W74-10876

DEEPWATER PORTS.
For primary bibliographic entry see Field 6E.
W74-10877

THE JUBILEE OF THE ROYAL COMMISSION STANDARD,
East Suffolk and Norfolk River Authority (England).
F. W. Roberts.
Water Pollution Control, Vol 73, No 2, p 129-137, 1974. 2 tab, 11 ref.

Descriptors: *Sewage disposal, *Standards, Testing, Biochemical oxygen demand, Nitrogen, Temperature, *Water quality standards, Suspended solids, Waste dilution, Reaeration, Potable water, *Administration, Water pollution control, Rivers.
Identifiers: *United Kingdom(Royal Commission on Sewage Disposal).

Factors involved both in setting standards and in assessing river pollution levels suggested by the Royal Commission on Sewage Disposal are discussed. Basic topics reviewed include tests for sewage and sewage effluents, dilution and suspended solids, reaeration capacity, potable water from rivers, and the administration of standards. (Sandoski-FIRL)
W74-10891

WATER LAWS IN USSR,
Himachal Pradesh State Electricity Board, Simla (India).
S. K. Sharma.
Indian Journal of Power and River Valley Development, Vol 23, No 12, p 392-393, December, 1973.

Descriptors: *Riparian rights, *Legislation, Planning, Law enforcement, Resource allocation, *Water pollution control, *Water law.
Identifiers: *USSR.

The water laws of the USSR as embodied in the legislation entitled 'Foundation of Water Manage-

ment Legislation of the Union of Soviet Socialist Republics', passed by the Supreme Soviet in December 1970 are reviewed. This legislation is composed of five main parts: 'General Regulations', ownership, regulation, etc.; 'Water Management', grant of use to municipalities, etc.; 'Protection of Waters and Prevention of Their Detrimental Effect', control of pollution, etc.; 'State Control and Planning of Water Utilization', resources inventory and resource allocation; and 'Responsibility for Breaking the Water Laws', the civil and criminal code as it applies to this legislation. (Shaffer-FIRL)
W74-10893

COUNTY WATER SYSTEM SOLVES DRY AREA PROBLEMS,
Salt Lake County Water Conservancy District, Utah.
For primary bibliographic entry see Field 6D.
W74-10894

RIVERS POLLUTION SURVEY IN SCOTLAND IN RETROSPECT AND PROSPECT,
Secretary of State for Scotland, Edinburgh. Scottish Development Dept.
E. H. Nicoll.
Water Pollution Control, Vol 73, No 2, p 178-181, 1974.

Descriptors: *Rivers, *Surveys, *Sewage treatment, *Water pollution sources, Water quality control, Governments, Legislation, History.
Identifiers: *United Kingdom(Scotland).

A brief review of the legislation and regulations formulated by the Scotish River Commission is presented. A survey report published in 1972 recorded 234 sewerage authorities serving 5.2 million persons with two-thirds of this population being served by drainage systems terminating in tidal reaches of rivers, estuaries, and the open sea. Six percent of all principal rivers were of poor quality or grossly polluted. Expenditures for sewerage, sewage treatment, and disposal are given for 1971. (Sandoski-FIRL)
W74-10896

IS THE WATER SAFE TO DRINK. PART I: THE PROBLEM,
Environmental Defense Fund, Washington, D.C. Water Resources Program.
For primary bibliographic entry see Field 5F.
W74-10897

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

A MODEL FOR EVALUATING RUNOFF-QUALITY IN METROPOLITAN MASTER PLANNING,
Water Resources Engineers, Walnut Creek, Calif.; Hydrologic Engineering Center, Davis, Calif.; San Francisco City and County Dept. of Public Works, Calif.
For primary bibliographic entry see Field 5D.
W74-10396

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: ECONOMIC AND ENVIRONMENTAL IMPACTS OF SURFACE RUNOFF DISPOSAL SYSTEMS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Economics.
W. L. Miller, and S. P. Erickson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 315, $4.00 in paper copy, $2.25 in microfiche. Purdue University Water Resources Research Center Technical Report No 39. 1973. 74 p, 4 fig, 17 tab, 70 ref. OWRR C-3277(no 3713)(5).

Descriptors: *Storm runoff, *Storm water, *Urban runoff, *Water pollution sources, *City planning, Drainage systems, *Urban drainage, *Water quality, *Decision making, Economic impact, Economic efficiency, Planning, Methodology, Surface waters, Surface drainage, Rainfall-runoff relationships, Diffused surface water, Water resources development, Land use, Community development, Urban hydrology, Storm drains, *Indiana.
Identifiers: *Environmental impact, *West Lafayette(Ind), Tippecanoe County(Ind).

The research involves the comparison of alternative system designs to dispose of runoff from rainfall in urban and suburban areas. The systems were compared on the basis of system cost and water quality parameters. This type of comparison provides communities with information about the relationship between cost and water quality. With that information a community can choose that system design which provides the combination of cost and water quality which it selects as most appropriate to its needs. The model developed to compare alternative systems for storm water removal was applied to a watershed in West Lafayette, Indiana. Based on analysis of this watershed, implications were drawn about the drainage system cost and water quality associated with alternative land use in Tippecanoe County, Indiana in the year 2020.
W74-10397

ESSENTIALS OF GROUND-WATER HYDROLOGY PERTINENT TO WATER-RESOURCES PLANNING,
Water Resources Council, Washington, D.C. Hydrology Committee.
For primary bibliographic entry see Field 2F.
W74-10410

OPTIMIZATION TECHNIQUES FOR MINIMIZATION OF COMBINED SEWER OVERFLOW,
Dept. of Civil Engineering. Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 5D.
W74-10415

THE SOCIAL DIMENSIONS OF WATER-RESOURCES PLANNING,
Anacapa Sciences, Inc., Santa Barbara, Calif.
For primary bibliographic entry see Field 6B.
W74-10416

COMPUTER SIMULATION OF SNOWMELT WITHIN A COLORADO SUBALPINE WATERSHED,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 2C.
W74-10424

WATERHEAD FORECAST POSSIBILITIES ON HYDRAULIC BASIS,
For primary bibliographic entry see Field 4A.
W74-10453

TOWARD THE STRUCTURE OF A PRODUCTION FUNCTION FOR WHEAT YIELDS WITH DATED INPUTS OF IRRIGATION WATER,
Indian Statistical Inst., New Delhi. Planning Unit.
For primary bibliographic entry see Field 3F.
W74-10600

OPTIMAL CONTROL OF MULTIUNIT INTER-BASIN WATER RESOURCE SYSTEMS,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W74-10603

6B. Evaluation Process

MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS,
Utah State Univ., Logan. Inst. for Social Science Research on Natural Resources.
For primary bibliographic entry see Field 4C.
W74-10351

PUBLIC PARTICIPATION IN WATER RESOURCES PLANNING AND DECISION-MAKING THROUGH INFORMATION-EDUCATION PROGRAMS: A STATE-OF-THE-ARTS STUDY,
Mississippi State Univ., State College. Social Science Research Center.
P. J. Ross, B. G. Spencer, and J. H. Peterson, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 317 $3.75 in paper copy, $2.25 in microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report, 1974. 46 p, 2 tab, 2 fig, 68 ref. OWRR B-012-MISS(1).

Descriptors: *Social participation, *Education, *Information exchange, *Decision making, *Planning, Reviews, *Mississippi, Design criteria, Model studies.

The purpose was to explore the state-of-the-art of activities to inform and educate publics regarding water resources programs. This objective was sought through (1) a critical and systematic review of literature, including both published and unpublished technical and scientific documents, and (2) a study of information/education programs of agencies involved in various levels of water resources planning and management in the state of Mississippi. The findings suggested two conclusions about past and current participation activities and policies of water resources agencies: (1) not only are water resources agencies keenly aware of the importance of soliciting public input in plans and decisions regarding water resources programs, but efforts undertaken to do so have been substantial; and (2) the sucess of agencies in effectively involving publics in their planning activities and in securing public support for proposals has not been commensurate with the effort expended. The implications of the research for planning effective educational/information programs are discussed. Specific recommendations are incorporated into the design of a model of the planning process.
W74-10393

ESSENTIALS OF GROUND-WATER HYDROLOGY PERTINENT TO WATER-RESOURCES PLANNING,
Water Resources Council, Washington, D.C. Hydrology Committee.
For primary bibliographic entry see Field 2F.
W74-10410

THE MARKET STRUCTURE OF THE SOUTHERN CALIFORNIA WATER INDUSTRY,
Copley International Corp., La Jolla, Calif.
L. D. Schelhorse, M. L. Zimmerman, J. W. Milliman, D. L. Shapiro, and L. F. Weschler.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 333, $5.75 in paper copy, $2.25 in microfiche. Completion Report, June 1974. 204 p, 20 fig, 32 tab, 118 ref, 4 append. OWRR C-4007(No 9002)(1).

Descriptors: *Water rights, *Economic efficiency, *Elasticity of demand, *Municipal water, *Regression analysis, *Resource allocation, *Groundwater management, Water resources development, Management, Pricing, Decision-making, *California, Administrative agencies, Administrative decisions, Economies of scale, Water demand, Water utilization, Irrigation water, *Industrial water, Conjunctive use, Public utility districts, Water allocation(Policy).
Identifiers: *Southern California.

An industry analysis deals with three aspects: structure, conduct, and performance. This study examined the salient features of market structure and suggested four hypotheses on conduct and two on economic performance. Water supply in semi-arid Southern California consists of substantial groundwater and meager local surface supplies, augmented by extensive imported water. Three-fourths of the currently imported water supply is utilized by agriculture. A plentiful supply exists under current conditions and for reasonable projections of population growth. Operating costs are relatively low when compared to the high fixed cost of facilities already in place. Apparent economies of scale exist in the construction of water delivery systems. The quantity of water consumed does vary inversely with price, i.e., a non-zero price elasticity of demand exists in the region. There exists a de-facto lack of transferability of water rights in California which is encouraged under court and administrative interpretation of water law and by the logic of public collective decision-making bodies. Political considerations take the place of markets in allocating water among uses and users. The water industry is characterized by a public agency orientation, with access to tax revenues and the ability to charge different prices to various final users. Little vertical or horizontal integration exists.
W74-10414

THE SOCIAL DIMENSIONS OF WATER-RESOURCES PLANNING,
Anacapa Sciences, Inc., Santa Barbara, Calif.
D. H. Harris.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 354, $4.00 in paper copy, $2.25 in microfiche. Technical Report 160, March 1974. 90 p, 17 fig, 9 tab, 33 ref, 8 append. OWRR C-4025(No 9005)(1).

Descriptors: *Planning, *Decision-making, *Social aspects, *Social values, *Water resources, *Dimensional analysis, Social participation, Aesthetics, Water quality, Water allocation(Policy), Water conservation, Attitudes.
Identifiers: *Multidimensional analysis, *Factor analysis.

A framework was developed for incorporating social factors (those which concern social well-being and quality of human life) along with technical and economic factors into the water-resources planning-decision process. Initially, 388 water-resources concepts from the social domain were collected, screened, and grouped to define 42 different social factors. Then, from ratings of similarity-dissimilarity by 300 raters, a matrix was generated of mean distances between all 861 possible factor pairs; the matrix was analyzed by computer-based multidimensional scaling techniques to determine the underlying dimensional structure. Finally, using procedures that paralleled those for determining factor similarity-dissimilarity, a value reflecting social importance was developed for each of the 42 factors and for the 5 basic social dimensions which emerged from the multidimensional analysis. These values were found to cover a wide range; however, values for the same factors and dimensions were found to be nearly identical among different sub-groups of people, even those with potentially divergent viewpoints, such as social scientists and water-works professionals. Methods for incorporating appropriate social factors, along with technical and economic factors, were described for each of the seven major components of the water-resources planning-decision process.
W74-10416

LEGISLATIVE HISTORY OF FEDERAL RIVER BASIN PLANNING ORGANIZATIONS,
For primary bibliographic entry see Field 6E.
W74-10520

INCOME DISTRIBUTIONAL CONSEQUENCES OF PUBLICLY PROVIDED IRRIGATION: THE COLUMBIA BASIN PROJECT,
Washington State Univ., Pullman. Dept. of Agricultural Economic.
For primary bibliographic entry see Field 3F.
W74-10524

DISTRIBUTIONAL CONSEQUENCES OF RECREATION PROVISION IN WATER RESOURCE PROJECTS--THE POTHOLES RESERVOIR,
Washington State Univ., Pullman. Dept. of Agricultural Economics.
W. R. Butcher, and C. D. Ditwiler.
Completion Report, July 1, 1974, 3 p. OWRR A-060-WASH(2). 14-31-0001-4048.

Descriptors: *Columbia River, Economics, *Income distribution, *Project post-evaluation, *Recreation, Welfare(Economics), *Washington, Investment, Costs, Government finance, Government supports.
Identifiers: *Columbia Basin Project, *Potholes Reservoir(Wash).

The purpose of this economic study is to investigate the income distributional consequences of the public funds that have created and continue to support and maintain the recreational opportunities of the Potholes Reservoir, located in the central portion of the Columbia Basin Project, Washington. Personal interviews of recreationists conducted during the major part of the recreational season provide data necessary to construct use curves by income class for each major reservoir activity. From these curves, a 'welfare gain' will be computed for each recreational party. From the welfare gain, investment costs made by the recreationist, as well as his contribution through taxes and user fees to cover the public costs, will be subtracted to obtain an estimate of net welfare gain. Classification of the net welfare gain by relevant income classes, geographical area, and occupation and family statuses will be made.
W74-10550

THE MIAMI CONSERVANCY DISTRICT AS A SOCIAL INSTRUMENT,
Johns Hopkins Univ., Baltimore, Md.
A. Wolman.
Journal of the American Water Works Association, Vol 66, No 3, p 139-141, March 1974.

Descriptors: *Social function, *Social participation, History, *Florida, *Water districts, Organizations.
Identifiers: *Miami Conservancy District(Fla).

The history and purpose of the Miami Conservancy District are discussed with emphasis on its application as a social instrument. The District was formed in 1913 after a disastrous flood. It exemplified an epic of achievements in innovating processes of government, of engineering, and of social organization. These essential elements for progressive encounter with new goals are still current. The aims of the District are to plan for the full development of the water resources; to develop intelligent bookkeeping of them; to engage in stream beautification; and to design, construct, maintain, and operate where appropriate waste treatment facilities. The District moved from a relatively static custodial position to dynamic total river management, and a $100 million waste water improvement complex. The District will expand in function and in geographic boundary as it is necessary to maintain its purpose. (Merritt-FIRL)
W74-10560

FIDELITY OF INFORMATION TRANSMISSION IN LOCAL CAMPAIGNS ON WATER ISSUES,
Illinois Univ., Urbana. Dept. of Agricultural Economics and Sociology.
F. C. Fliegel, and J. E. Kivlin.
Available from NTIS, Springfield, Va 22161 as PB-234 543 $4.50 in paper copy; $2.25 in microfiche. Illinois Water Resources Center, Urbana, Research Rept No. 82, March 1974. 108 p, 15 tables, 1 fig, 20 ref, append. OWRR B-052-ILL(1), 14-31-0001-3513.

Descriptors: *Attitudes, Social aspects, *Information exchange, Water supply, Social participation, Legal aspects, Local governments, Treatment facilities, Water pollution.
Identifiers: Plan implementation, Information transmission(Social), Message distortion(Social), Voting, Public issues.

Most issues involving water supply are public issues, and achieving consensus for solution of problems in this area is problematic, therefore a study was designed to assess whether information about water issues is distorted in successive transmissions, thereby inhibiting achievement of consensus. The issue in the study community hinged on expansion of its sewage treatment facility, or losing local industry in order to abate the flow of inadequately treated effluent into a local river. Analysis showed that degree of exposure of information about water pollution, and especially to official information sources, contributed to consensus on the seriousness of the problem, but not to consensus on problem solution. Therefore it seemed unlikely that sheer information loss or other modifications of message content in successive transmissions of information could account for a lack of consensus on problem solution. However, analyzing respondents' basic attitudes as determinants of positions on pollution issues, showed more promising results. Tentative findings indicate that people who view themselves as dependent, and lacking in ability to predict events, are most prone to favor corporate action. It is suggested that information campaigns on public issues should take into account the link between people's basic attitudes and issue-specific attitudes.
W74-10690

PROGRESS IN THE RURAL WATER PROGRAMS OF LATIN AMERICA,
Pan American Health Organization, Washington, D.C.
D. Donaldson.
Bulletin of the Pan American Health Organization, Vol 8, No 1, p 37-53, 1974. 2 fig, 6 tab, 18 ref.

Descriptors: *Potable water, *Water supply, *Rural areas, *Future planning(Projected), Water resources development, South America, Mexico.
Identifiers: *Latin America, Central America.

The proportion of rural people in Latin America with access to potable water rose dramatically during the last decade. The current situation is detailed and a number of existing problems are explored. Past programs have tended to concentrate on village or 'urban' areas in order to reach the most people in the shortest time at the lowest cost, favoring 'revolving' funds to supply internal financing and the 'mass approach' to coordinated rural community development. (Sandoski-FIRL)
W74-10887

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

MINNESOTA FLOODS, 1972--COSTS, PROGRAMS AND POLICY IMPLICATIONS,
Minnesota Univ., Minneapolis. Dept. of Agricultural and Applied Economics.
For primary bibliographic entry see Field 6F.
W74-10417

INCOME DISTRIBUTIONAL CONSEQUENCES OF PUBLICLY PROVIDED IRRIGATION: THE COLUMBIA BASIN PROJECT,
Washington State Univ., Pullman. Dept. of Agricultural Economic.
For primary bibliographic entry see Field 3F.
W74-10524

ECONOMICS OF LAND USE REGULATION IN FLOOD HAZARD AREAS,
Minnesota Univ., St. Paul. Agriculture Extension Service.
For primary bibliographic entry see Field 6F.
W74-10529

COST OF DEVELOPING GROUND WATER IN THE PAT HARRISON WATERWAY DISTRICT, MISSISSIPPI,
University of Hattiesburg, Southern Missippi. Bureau of Business Research.
For primary bibliographic entry see Field 4B.
W74-10530

TOWN 'CAPTURES' NATURAL SPRING: CUTS WATER TREATMENT COSTS,
Allen and Hoshall, Memphis, Tenn.
For primary bibliographic entry see Field 5F.
W74-10567

PRICE RESPONSIVENESS OF THE INDUSTRIAL DEMAND FOR WATER,
Lehigh Univ., Bethlehem, Pa. Dept. of Economics.
For primary bibliographic entry see Field 6D.
W74-10597

DETERMINATION OF INVESTMENT COST FUNCTIONS OF WATER TREATMENT PLANTS,
Illinois Univ., Urbana. Dept. of Business Administration.
For primary bibliographic entry see Field 5F.
W74-10691

6D. Water Demand

THE MARKET STRUCTURE OF THE SOUTHERN CALIFORNIA WATER INDUSTRY,
Copley International Corp., La Jolla, Calif.
For primary bibliographic entry see Field 6B.
W74-10414

PRICE RESPONSIVENESS OF THE INDUSTRIAL DEMAND FOR WATER,
Lehigh Univ., Bethlehem, Pa. Dept. of Economics.
J. De Rooy.
Water Resources Research, Vol 10, No 3, p 403-406, June 1974. 4 tab, 12 ref.

Descriptors: *Water demand, *Industrial water, *Prices, Water utilization, Industrial plants, Chemical industry, New Jersey, Water quantity, Equations, Estimating, Technology, Employment, Regression analysis, Mathematical models, Systems analysis.
Identifiers: Production function, Price elasticity, Disaggregation.

Examined is the sensitivity of the industrial demand for water to changes in price. A simple model of the demand for water by manufacturing firms provides evidence that industrial users respond significantly to even small changes in unit cost (used here as proxy for market price). Demand is also significantly affected by changes in output, by technological improvements, and by employment. The model is disaggregated since requirements for intake are dependent on the intended type of use and since the cost of water supply is related to qualitative requirements, which depend on type of use. Separate equations are given for each of four water use categories common to manufacturing operations: (1) cooling; (2) processing; (3) steam power; and (4) sanitation. Model parameters are estimated with data collected from a survey of water use of 30 large chemical manufacturing plants in northern New Jersey in 1965. (Bell-Cornell)
W74-10597

REPORT ON THE LAMBOURN VALLEY PILOT SCHEME, 1967-1969,
Thames Conservancy, Reading (England).
For primary bibliographic entry see Field 4B.
W74-10862

PROGRESS IN THE RURAL WATER PROGRAMS OF LATIN AMERICA,
Pan American Health Organization, Washington, D.C.
For primary bibliographic entry see Field 6B.
W74-10887

COUNTY WATER SYSTEM SOLVES DRY AREA PROBLEMS,
Salt Lake County Water Conservancy District, Utah.
R. B. Hilbert, and R. T. Holzworth.
Public Works, Vol 105, No 6, p 72-73, June 1974.

Descriptors: Water resources, *Municipal water, Water resources development, Planning, *Water supply, Water distribution, *Arid climates, *Utah, *Local governments, Cities, Land use, *Water districts, *Comprehensive planning.
Identifiers: *Salt Lake City(Utah).

Discussed are the problems and complexities involved in the supply of adequate water to a large and expanding metropolitan area where average annual rainfall is only 16 inches. Using a mix of facilities including deep wells, springs, river diversions, runoff impoundment, and groundwater management, Salt Lake City has been able to meet its needs to date. Future growth in the area appears to depend on the willingness of the state to support the importation of water from outside the Salt Lake City region as all local resources are almost fully development. The need for land-use planning and comprehensive consideration of a multitude of factors in future water supply is discussed. (Shaffer-FIRL)
W74-10894

CAN DREDGING BE CONTINUED TO MAINTAIN GREAT LAKES,
Corps of Engineers, Chicago, Ill. North Central Div.
C. Cable.
World Dredging and Marine Construction, Vol 10, No 5, p 24-27, May, 1974. 5 fig.

Descriptors: *Dredging, *Solid wastes, Disposal, Harbors, Channels, *Chennel improvement, Environmental effects, Costs, *Great Lakes, Research and development, *Waste disposal, Canals.
Identifiers: Polluted dredge material, *Land disposal.

Escalating dredging costs, environmental concerns, inflation, misinformation, and moratoriums on dredging have raised the issue of whether dredging operations can be contined on the Great Lakes. The Army Corps of Engineers maitains 64 harbors, 157 miles of improved channel, and the locks of the St. Mary's Falls Canal. Normal dredging workload amounts to around 12 million cubic yards for maintenance and 1 million cubic yards for the improvement of these facilities each year. For the past six years the dredging level has been restricted to about 50 percent of normal and will continue to be curtailed until suitable disposal sites on land can be found and prepared to take polluted dredge material. There are 71 dredging projects which will require land disposal sites. The Corps is currently developing plans for 16 of these sites. Two sites are moving into preparation now with the other 14 to start later this year. The Corps at its waterways Experiment Station is currently engaged in research in seven broad areas: environmental impacts and aspects of open water disposal; environmental impacts and aspects of land disposal; new disposal concepts; productive uses of dredged material; disposal area reuse and multiple utilization; dredge material treatment techniques and equipment; and dredging/disposal equipment and techniques. (Shaffer-FIRL)
W74-10899

6E. Water Law and Institutions

RHODE ISLAND'S OCEAN SANDS: MANAGEMENT GUIDELINES FOR SAND AND GRAVEL EXTRACTION IN STATE WATERS,
Rhode Island Univ., Kingston. Coastal Resources Center.
For primary bibliographic entry see Field 5G.
W74-10437

WATER AND POLITICS IN COASTAL CALIFORNIA - THE DIABLO CANYON EXPERIENCE,
Washington Univ., Seattle. Dept. of Political Science.
For primary bibliographic entry see Field 5D.
W74-10480

PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATIONS BILL, 1974, PART 5, TENNESSEE VALLEY AUTHORITY.
Hearings---Subcomm of the Committee on Appropriations---United States House of Representatives, 93rd Cong, 1st Sess, May 1, 1973. 412 p.

Descriptors: *Tennessee Valley Authority, *Tennessee, *Federal project policy, *Cost benefit analysis, *Flood control, Direct benefits, Direct costs, Economic justification, Research and development, Nuclear wastes, Water resources development, Watershed management, Water cooling, Economic feasibility, Tennessee River, Navigation, Water quality, Planning, Construction.

Present in these hearings concerning the Tennessee Valley Authority, as witnesses, were the TVA director of tributary area development, the director of water control planning, and the director of fisheries, among others. Discussed in the hearings are the benefits of flood control in saving property loss. Also presented is the budget for the Tennessee Valley Authority. The witnesses discussed allocations for studies and programs concerning the effect of heated water on the environment, water resources management, fisheries and water fowl management, water quality management, as well as navigation. The Public Works Subcommittee members questioned the various witnesses on expenditures placed in their budgets and received the reasons and justifications for those expenditures. (Sperling-Florida)
W74-10500

COMPACT FOR DEVELOPMENT OF DEEP DRAFT HARBOR AND TERMINAL.
Miss. Code Ann., secs. 59-6-1 to 59-6-7 (Supp. 1973).

Descriptors: *Mississippi, *Alabama, *Interstate compacts, *Port authorities, Adoption of practices, Coastal structures, Governments, Political aspects, State governments, Navigation, Federal government, Administration, Administrative agencies, Boats, Cost allocation, Economic aspects, Budgeting, Coordination, Harbors, Administrative costs, Decision making, Legislation, Management, Project planning.
Identifiers: *Administrative regulations, Deep draft harbors.

An interstate compact is authorized with the state of Alabama concerning the construction of deep draft harbors and terminals. The compact is aimed at a joint deep draft harbor and terminal on the continental shelf in the Gulf of Mexico. Also established is an authority to administer the project and the number of persons in the authority, their terms, renumeration, time of meetings, and method of appointment. The authority has power to conduct studies and surveys of all problems, benefits, and other matters associated with the deep draft facilities. They may also conduct hearings to achieve these ends. They can accept, hold, and dispose of any money acquired by gift or otherwise. The authority will formulate plans and policies for the purpose of smphasizing this cimpact befor Congress and other appropriate federal agencies. The contribution of each state will be in the proportion that its population bears to the total population of the party states. The statute also grants the necessary power to the governor, the compact administrator, and the Gulf Coast Superport Development Authority for Mississippi to carry out the purposes of the compact. (Sperling-Florida)
W74-10501

ANNUAL STATE STRATEGY FOR WATER QUALITY CONTROL, FISCAL 1973-74.
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 5G.
W74-10502

WATER SUPPLY.
N.Y. Environmental Conservation Law, secs. 15-1501 thru 15-1529 (1972).

Descriptors: *Water supply, *Water demand, *Multi-purpose projects, *Water resources development, *New York, Water conservation, Legislation, Cost allocation, Structures, Permits, Reservoir operation, Water resources, Water rights, Inter-agency cooperation, Reservoirs, Water management(Applied).

Water resources and the need for additional water supplies are discussed. Maps or plans of new or additional sources of water supply must first be submitted to the New York Department of Environmental Conservation and approved before operations may proceed. Application for approval of plans must be in writing and contain proof of adequate authorization for the project, including a map of the lands to be acquired and plans of the proposed construction, if any. After such application has been submitted, the department, upon notice, shall conduct public hearings to determine the project's feasibility. Consent of the department must be had to deliver any water to any other state. Application procedures for municipal water supply reservoirs on forest preserve lands are set forth in much the same manner. Within five years of the approval of these plans, the applicant may petition the department to construct the reservoir and appurtenant works. The cost of any such project shall be paid by the applicant, and the supervision and operation of the works will be under the direction of the departments of transportation and conservation. The reservoir shall be owned by the state, and lands thereunder shall be conveyed to the state by the applicant. Provisions are then set forth for reservoir repairs, supply to other public water systems, and the payment of damages. (Sutton-Florida)
W74-10504

THE BLACK TIDE,
Washington Univ., Seattle. Center for the Biology of Natural Systems.
For primary bibliographic entry see Field 5G.
W74-10505

THE FEDERAL OCEAN PROGRAM. THE ANNUAL REPORT OF THE PRESIDENT TO THE CONGRESS ON THE NATION'S EFFORTS TO COMPREHEND, CONSERVE, AND USE THE SEA.
Office of Science and Technology, Washington, D.C.
April 1972. 122 p, 26 photo, 5 fig.

Descriptors: *Federal government, *Research priorities, *Marine biology, *Mapping, *Research facilities, Commercial fishing, Fisheries, Coasts, Continental shelf, Oceanography, Oceans, Estuaries, Monitoring, Forecasting, Marine geology, Geophysics.
Identifiers: *Federal ocean program.

During 1971, strong emphasis was placed on improvements in the management of living and nonliving marine resources, on easing pressures which threaten certain species with extinction, and on enforcement of measures to prevent environmental pollution and degradation. Studies have been stepped up in the management of coastal zones to protect fisheries, to make them available for marine transportation, to minimize pollution, and to enhance their recreational values. In relation to energy supplies, the Federal Ocean Program has moved to explore the geophysical and geological character of the continental shelves. Extensive work is underway in monitoring, predicting, and mapping the oceans and ocean floors. Many large-scale studies are underway at ocean 'laboratories' with arrays of ships, specially designed buoys, aircraft, eath-orbiting satellites, and submersibles to apply collective efforts to solve special problems and to advance the national capability in marine sciences and technology. (Conko-Florida)
W74-10506

WATER AUTHORITIES.
Ill. Ann. Stat., ch. Ill 2/3, secs. 225, 227, 227.1, 228 (Smith-Hurd Supp. 1973).

Descriptors: *Water control, *Water policy, *Illinois, *Legislation, *Water distribution, Water allocation, Distribution systems, Water delivery, Water systems, Water resources, Water resources development, Water utilization, Water management, Natural resources, Public utility, Utilities, Water requirements, Local governments, Water supply, Water sources.

Illinois water guidelines are set out for the Board of Trustees of authorities. Each authority shall have a governing board of at least three trustees, the number to depend upon the political and geographical makeup of the authority. The terms of office shall vary from one to three years for the several trustees. After the authority has been organized and the trustees have once been appointed, the successive trustees shall be elected by the constituents of each authority. Each trustee shall furnish a $5,000 security bond to assure the faithful performance of his duties and the faithful accounting for all moneys that may come into his hands. Various provisions are also included in regard to elections, petitions and ballots which may concern the authorities. Also included are various provisions dealing with effective dates of office and other political and governmental functions. (Silber-Florida)
W74-10507

RECREATIONAL DEVELOPMENT.
Tenn. Code Ann., secs. 11-1201 thru 11-1207 (1965).

Descriptors: *Recreation, *Recreation facilities, *Community development, Federal project policy, Federal government, Administration, Federal budget, Cost sharing, Legislation, Tennessee, Adoption of practices, State governments, Political aspects, Water sources development.

The state of Tennessee should participate in the benefits of private, local and federal government assistance programs for the planning and development of outdoor recreational resources. Toward this purpose, the acquisition of such land and water areas as the Commissioner of Conservation deems necessary is provided for. The Commissioner may apply for participation in or the receipt of aid from any federal programs respecting outdoor recreation. He may enter into contracts with appropriate federal agencies, keep records of such actions, and furnish such reports and information as may be necessary to enable officials and agencies to perform their duties under such programs. A non-salaried Recreational Advisory Committee is created. If funds from local sources are available, the Commissioner may enter into and administer agreements with the federal government for planning, acquisition and development projects involving participating federal-aid funds. Funds from the state treasury shall be distributed in the normal manner. (Sutton-Florida)
W74-10508

OIL POLLUTION CONTROL.
N.C. Gen. Stat., secs. 143-215.75 thru 143-215.82 (1973).

Descriptors: *North Carolina, *Public health, *Oil wastes, *Water pollution sources, *Oil pollution, Safety, Waste water disposal, Administrative agencies, Oily water, Onsite tests, On-site investigations, Regulation, Administration, Legal aspects, Wildlife conservation, Sewerage districts, Local governments, Oil spills, Water pollution control, State governments.

The purpose is to promote the health and safety of the public by protecting the land and waters from pollution by oil, oil products, and oil by-products. The North Carolina Board of Water and Air Resources shall make inspections and investigations to assure compliance with the statute, and to determine the nature and location of any oil discharged into the state's waters. The authorized representatives of the Board upon presentation of their credentials can enter upon any public or private property to inspect, investigate, or to disperse or remove oil discharges. Any information which is confidential, but discovered or obtained in the course of an inspection will not be revealed, except by lawful order or process. No power granted to the Board will be construed to deny any local government, sanitary or sewerage district from exercising polic powers with reference to the prevention and control of oil discharges into sewers or disposal systems. (Sperling-Florida)
W74-10509

IN RE MAINE CLEAN FUELS, INC. (JUDICIAL REVIEW OF DENIAL OF APPLICATION FOR PROPOSED OIL REFINERY).
310 A.2d 736 (Me. 1973).

Descriptors: *Maine, *Judicial decisions, *Legal aspects, *Permits, *Standards, Regulation, Environmental protection, Natural resources, Management, Development, Administrative decisions, Legislation, Political aspects, Ecology, Water resources development, Oil industry, Environmental effects, Administrative agencies, State governments.

A proceeding in the Supreme Judicial Court of Main by an unsuccessful applicant for development of an oil refinery is presented. The petitioner's application was denied by Main's Environmental Improvement Commission. The Maine Supreme Court held that the state's Site Location Law was constitutional, that the Commission's procedures did not violate due process and that there was substantial evidence to support the findings of the Commission that the applicant had failed to sustain the burden of proving that it could meet each of the statutory criteria. The Site Location Law was enacted to provide the state with a means of minimizing, through the exercise of its police power, the irreparable damage being done to the environment. As long as the methods adopted by the legislature to be used by the Commission in evaluating applications are rationally related to the purpose of the enactment, they are a valid exercise of the police powers. Inherent within the power of an administrative agency is the discretion to prescribe its own rules of procedure and to alter those rules when necessary for the achievement of its objectives. Relaxation or modification of such rules is not reversible error, absent a showing of injury or substantial prejudice. (Silber-Florida)
W74-10510

MISSOURI RIVER BASIN COMMISSION, ANNUAL REPORT FOR FY ENDING JUNE 30, 1972.
Water Resources Council, Washington, D.C.
Available from Nat Tech Info Serv, Springfield, Va 22161 as PB-221 027, $3.00 paper copy, $2.25 microfiche. 1972, 12 p.

Descriptors: *River basins, *River basin commissions, *River basin development, *Water Resources Planning Act, Missouri River, Interstate commissions, River systems, Watersheds(Basins), Drainage, Water sources, Running waters, Land use, Water resources, Water resources development, Missouri, Legislation, Rivers, Planning.
Identifiers: *Missouri River Basin Commission.

In 1972, President Nixon, in accordance with the Water Resources Planning Act of 1965, established the Missour River Basin Commission. The annual report of the Commission is presented for the fiscal year 1972. The Commission serves as the principal agency for the coordination of federal, state, interstate, local and nongovernmental plans for the development of water and related land resources in the basin. The primary function of the Commission is to prepare and keep up to date a comprehensive coordinated joint plant for the Missouri River Basin. Since its first organizational meeting in 1972, the Commission has accepted management and coordination responsibility for the Platte River Comprehensive Study, Nebraska. In addition, funding for a Comprehensive Study of the James River Basin in the Dakotas was requested for fiscal year 1974. (Flowers-Florida)
W74-10511

NEW ENGLAND RIVER BASINS COMMISSION 1973 ANNUAL REPORT.
New England River Basins Commission, Boston, Mass.
1974. 36 p, 30 photo.

Descriptors: *Water resources development, *River basins, *Water pollution control, *Project planning, *Programs, Decision making, Interagency cooperation, Federal government, New England, Water pollution sources, Flood plain management, Land use control, Coastal zone management, River basin commissions, River basin development.
Identifiers: *New England River Basin Commission.

An account is presented of efforts, including programs for coastal zone management, land use control, and new directions for established programs such as water pollution control, under the theme of 'Strategies for Natural Resources Decision-Making.' Important state initiatives are described and some of the New England River Basins Commission's programs to help deal with resource management issues in the region, in individual states and in those areas where major joint federal-state planning programs are underway are discussed. Special studies which were undertaken such as offshore oil, peaking power and flood plain management are discussed. The guide plan programs for Vermont, New Hampshire and Maine are discussed. Comprehensive planning programs including the Southeastern New England Study, the Long Island Sound Study and the Connecticut River Basin Program are examined. (Sutton-Florida)
W74-10512

HARTWIG V. U.S. (SEEKING DAMAGES AGAINST GOVERNMENT RESULTING FROM FLOODING).
485 F 2nd 615-622 (ct cl 1973).

Descriptors: *Judicial decisions, *Legal aspects, *Eminent domain, *Dams, *Flood damage, Condemnation, Irrigation, Floods, Erosion, Siltation, Damages, Flood control, Hydroelectric power, Flood protection, Compensation, Condemnation value, Benefits.
Identifiers: *Inverse condemnation.

Plaintiffs, owners and lessees of land, alleged that the operation of a series of dams caused extensive flooding, resulting in the permanent destruction of a portion of their land through erosion and the deposit of silt, as well as destruction of fences, irrigation ditches and other improvements. They contended that the actions of the government's agents in operating these dams constituted a taking of their property for which just compensation lay. A well-defined legal principle states that the United States is not liable for flood damage unless it is directly attributable to governmental action. Indirect or consequential damages are not compensable. To separate direct injuries from those which are consequential, the plaintiff must show that the property would be subjected to inevitably recurring inundation due to the action of the government. One or even several floods would not necessarily constitute a taking. Plaintiffs here failed to show that the situation is a continuing condition that will inevitably lead to future floods which would not otherwise occur. The plaintiffs' proximity to the federal irrigation project increased the value of their property, and through the facts presented, the plaintiffs failed to develop the losses which they suffered versus the benefits derived. (Ritchie-Florida)
W74-10515

WATER POLLUTION--PROHIBITIONS.
N Y Environmental Conservation Law, secs 17-0501 thru 17-0511 (1972).

Descriptors: *Water pollution, *Water pollution sources, *Water pollution treatment, *New York, Environmental sanitation, Water quality control, Waste water treatment, Water conservation, Legislation, Administration, Waste disposal, Water quality, Water pollution control, Pollutants, Water supply, Permits.

Prohibitions against water pollution are established. There is a general provision making it unlawful for any person to discharge organic or inoganic matter into New York state waters that shall violate established water pollution standards. A more specific prohibition is aimed toward pollution control of waters in the marine district which might be injurious to edible fish and shellfish. This provision covers sewage, industrial wastes, garbage and refuse of any kind. A permit is required for the making or use of a new outlet into state waters and for the operation or construction of disposal systems. A permit is also required to increase or alter the content of wastes discharged. The minimum degree of treatment required for the discharge of sanitary sewage will be the removal of substantially all floating and settleable solids and the removal of that amount of suspended solids normally expected from primary settling. Additional treatment may be required consistent with standards established for specific waters by the New York Department of Environmental Conservation. The use of existing or new outlets which discharge wastes shall be in compliance with all rules and regulations promulgated by the department. (Sutton-Florida)
W74-10516

ASKEW V. AMERICAN WATERWAYS OPERATORS, INC., REVISITED (COMMENTARY).
For primary bibliographic entry see Field 5G.
W74-10518

NEW WATER LAWS--WHAT THEY MEAN TO YOU,
Minnesota Dept. of Natural Resources, St. Paul. Div. of Waters, Soils and Minerals.
L. Seymour.
The Minnesota Volunteer, p 54-62, January/February 1974.

Descriptors: *Minnesota, *Water permits, *Water law, *Legislation, *Drainage programs, Alternative water use, Hydrology, Administrative decisions, Water policy, Flood plain zoning, Water resources development, Floodways, Flood protection, Regulation, Rivers, Streams, Flood control, Multiple purpose projects, Reservoir operation, Reservoir, Water management(Applied), Watershed management, Land management, Wild rivers.

In 1973 the Minnesota Legislature enacted several significant water laws. The Water Resources Permit Laws redefine and increase the regulatory scope of the Department of Natural Resources (DNR) to include all natural waters and waters beneficial to public use. DNR may require an impact statement from any developer to show that the development is reasonable, practical, and will adequately protect public safety and promote the general welfare. Generally, the law requires a permit and the permit is not a right but a privilege. The State Drainage Code directs DNR to develop criteria for establishing and improving drainage systems. DNR is to consider private and public cost-benefit analysis, availability of agricultural land, flooding characteristics of land, alternative conservation and water allocation measures, water quality, effect on wildlife and fisheries, ground water availability and a composite environmental impact statement. The Municipal Shoreland Management Act gives DNR the authority to include incorporated municipalities into Minnesota's Shoreland Management Program. DNR will administer flood plain management programs and dam management procedures. The co-ordination of these functions will allow more effective and safer use of rivers and reservoirs. (Barnes-Florida)
W74-10519

LEGISLATIVE HISTORY OF FEDERAL RIVER BASIN PLANNING ORGANIZATIONS,
T. M. Schad.
In: Organization and Methodology for River Basin Planning, p 85-103, 1967.

Descriptors: *River basin commissions, *River basin development, *Planning, *Water resources development, Water utilization, Flood control, Land management, Wildlife conservation, Recreation, Water conservation, Water quality, Water supply, Administration, Waste water treatment, Federal government, State governments, Cooperatives, Florida, South Carolina, Georgia,

Alabama, Navigable waters, Public health, Irrigation, Electric power plants.

Federal river basin planning organizations have evolved from three central concepts that have pervaded federal water resources planning activity. These three concepts are the federal study commission as a means of planning water resources development, the comprehensive planning concept, and the move toward joint federal and state participation in water resources planning. A bill providing for the Southeast River Basins Study Commission passed Congress in 1958. The purpose of the Commission was to provide a cooperative study on promoting the conservation, utilization, and development of land and water resources in the states of South Carolina, Georgia, Florida, and Alabama. Subjects to be covered were flood control and prevention, domestic and municipal water supplies, navigation safeguarding, land reclamation and irrigation. The study also was to cover the feasibility of hydroelectric power, recreation potentials, soil and forest conservation, pollution abatement, public health, and management of wildlife resources. (Sperling-Florida)
W74-10520

THE PROTECTION OF MARITIME ENVIRONMENT BY THE COURTS OF THIRD STATES: SOME DIFFICULTIES,
Cape Town Univ. (South Africa).
D. J. Devine.
McGill Law Journal, Vol 19, No 2, p 279-283, Fall 1973. 14 ref.

Descriptors: *International law, *International waters, *Law of the sea, *Governmental interrelations, *Africa, Legal aspects, Foreign countries, Political aspects, Regulation, Water law, Oceans, Aquatic environment, Ecology, Environmental control, Foreign waters, Natural resources, Continental shelf.
Identifiers: *Territorial waters, *Injunctive relief, *International agreements, *Territorial seas(Jurisdiction), *South Africa.

The enactment and enforcement of laws for the protection of the maritime environment present special problems in international law. A case in South Africa, South Atlantic Islands Development Corp., Ltd. v. Buchan, 1971 (1) S.A. 234 (c) illustrates some of these problems. A dispute in a South African court arose over the right to fish within the 12 mile territorial limit of Tristan da Cunha. Tristan da Cunha had allegedly granted exclusive rights to South Atlantic Ltd. The court held that it lacked the jurisdication to grant the injunctive relief sought due to the difficulty of enforcement and the inappropriateness of deciding an in rem dispute in a court other than the one in the nation where the problem originated. Systematic protection of the maritime environment is unlikely to occur on an international level within the next decade. The problem presented by the South Atlantic case could be ameliorated by an international agreement to encourage reciprocal enforcement of environmental protection laws. The decisions should be res judicata for the courts of all the signatories. (Deckert-Florida)
W74-10521

SIERRA CLUB V. MASON (MOTION TO VACATE INJUNCTION BARRING HARBOR DREDGING PROJECT).
365 F Supp 47-50 (D Conn 1973).

Descriptors: Water resources development, *Judicial decisions, *Project planning, *Harbors, Coastal engineering, *Connecticut, Environmental effects, Deep-water habitats, Ecology, Legal aspects, Feasibility studies, Federal project policy, Water policy, Dredging, Coasts, Organizations, Conservation.
Identifiers: Injunctive relief, *Environmental Impact Statements, National Environmental Policy Act(NEPA).

The Sierra Club secured a preliminary injunction, made final on May 10, 1973, barring the Corps of Engineers from undertaking a harbor dredging project until the filing of an environmental impact statement (EIS). Such a statement was made available in August 1973. The Corps sought to vacate that injunction while plaintiff sought, on cross motion, a modification of it requiring the Corps to abide by the assurances contained in the EIS. Both motions raised issues regarding the role of a District Court in implementing the National Environmental Policy Act (NEPA). The court stated that since the injunctive relief was conditional on the filing of an EIS, and the condition had been satisfied, the original injunction ought to be dissolved. The modification request raised two issues: whether the plaintiff has a right entitled to protection; and whether the defendent, unless restrained, will engage in conduct alleged to impair plaintiff's right. While stating the first issue was not free from doubt, as NEPA contains no explicit provision requiring performance of every commitment made, the court felt a decision as to the existence of a legally enforceable right would be inappropriate, absent an indication that the Corps had threatened non-compliance with the statement. As no such showing was made, the modification motion was denied. (Sutton-Florida)
W74-10522

ENVIRONMENT IMPACT REQUIREMENTS IN THE STATES: NEPA'S OFFSPRING,
Center for California Public Affairs, Claremont.
T. C. Trzyna.
Copy Available from GPO Sup Doc as EP1.23:600/5-74-006, $1.30; microfiche from NTIS, Springfield, Va 22161 as PB-234 384, $2.25. Environmental Protection Agency Socioeconomic Studies Series Report EPA-600/5-74-006, April 1974. 83 p, 194 ref. EPA Program Element 1HA095. 68-01-1818.

Descriptors: Environmental effects, Legal aspects, *State governments, Legislation, Regulation, Land use, *California.
Identifiers: State Environmental Protection Acts, *Environmental impact statements.

There is a growing trend in the States to adopt requirements for environmental impact statements like those in the National Environmental Policy Act fo 1969. Fifteen States and Puerto Rico now require impact statements for a wide range of activities significantly affecting the quality of the environment, and several others apply the process to limited classes of projects. At least twenty other States have such requirements under consideration. The State requirements are summarized and compared to each other and to the national act. Some key issues are discussed: contents of the impact statement, applicability to private projects and local governments, relation to land use regulation, enforcement, and citizen participation. (EPA)
W74-10527

MANAGEMENT AND ADMINISTRATION OF GROUND WATER IN INTERSTATE AQUIFERS, PHASE II,
Bittinger (M. W.) and Associates, Inc., Fort Collins, Colo.
For primary bibliographic entry see Field 4B.
W74-10537

LEGAL ASSURANCES OF ADEQUATE FLOWS OF FRESH WATER INTO TEXAS BAYS AND ESTUARIES TO MAINTAIN PROPER SALINITY LEVELS,
Texas Univ., Austin. School of Law.
C. W. Johnson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-222 036, $3.00 in paper copy, $2.25 in microfiche. Published by Texas Law Institute of Coastal and Marine Resources, Houston, Reprinted from: Houston Law Review, Vol 10, p 598-640, 1973.

Descriptors: *Texas, *Water law, *Estuaries, *Water policy, *Natural resources, Conservation, Planning, Land development, Land management, Water management, Water development, Riparian rights, Legal aspects, Judicial decisions, Public lands, Estuarine environment, Aquatic life, Bays, Coasts, Shores, Streams, Streamflow, Tides, Sea water, Saline water-fresh water interfaces, Pollution, Pollution control, Pollution abatement, Filling, Dredging, Marine life.
Identifiers: *Public trust doctrine, *Coastal zone management.

Water in coastal bays, lagoons and estuaries is a mixture of sea water, rain, and inflows from streams, groundwater and surface runoff. Increased water utilization, storage, reuse and interbasin transfers expectedly will reduce the volume of such inflows and alter the seawater-freshwater balance of these areas. Only with proper salinity balance can the unique biological characteristics of the estuarine zones be maintained. The Texas coast represents a significant 1800 miles of shoreline of which 1419 miles are bays and estuaries and another 373 miles faces the Gulf. Water pollution, filling and dredging are the most immediate threats, as well as alteration of the salinity balance. The most immediate effects are felt by marine and estuarine life, as the fresh water inflow so often diverted contains many essential nutrients. Riparian rights are of little or no significance in assuring a proper fresh water flow to estuaries. Texas may be able to rely on the public trust doctrine as its vehicle, maintaining state ownership of tidal lands, waters and resources, in trust for the public's benefit. Although the judicial temperament towards such a policy is uncertain, it seems to have received favorable acceptance in many jurisdictions and eliminates the pitfalls encountered by attacking the problem via the riparian rights approach. (Silber-Florida)
W74-10549

PUBLIC WORKS FOR WATER AND POWEER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1975, PART I, PART II.
Hearings--Subcomm on Water Resources, Comm on Appropriations, U.S. House of Representatives, 93d Cong, 2d Sess, 1974. 1362 p.

Descriptors: *Federal government, *Government finance, *Federal project policy, *Project planning, Cost sharing, Water policy, Water resources, Water resources development, Dams, Flood control, River basins, River basin commissions, River basin development, Delaware River Basin Commission, Land management, Water utilization, Water management(Applied), Environmental effects.
Identifiers: Army Corps of Engineers.

These hearings were held in connection with the 1975 Public Works for Water and Power Development and Atomic Energy Commission Appropriation Bill. Statements were taken by the Chief and the heads of various divisions of the Army Corps of Engineers in connection with its fiscal year 1975 budget. Statements and budgets were also inserted regarding the Delaware River Basin Commission and the Susquehanna River Basin Commission. The proposed budget for the Army Corps of Engineers was less than that of a year earlier. The Chief of the Corps cited delays in both new and partially completed projects to be the effect of responsibilities imposed upon the Corps by recently enacted environmental legislation, specifically the National Environmental Protection Act and the Flood Disaster Protection Act. The water resources program conducted by the Corps of Engineers has been influenced by environmental considerations, policy issues on cost sharing and use fees, greater competition for federal funds, and the energy crisis. Although these major factors have resulted in a significant reduction of new construction starts, they have improved program management. (Ritchie-Florida)
W74-10697

THERMAL POLLUTION--A GROWING CONCERN,
Michigan Dept. of Natural Resources, Lansing.
For primary bibliographic entry see Field 5G.
W74-10698

COLOMBIA'S VIEW OF MARITIME LEGAL PROBLEMS,
G. Wood.
In: Sea Grant Publication UNC-SG-73-01, p 191-197, March, 1973. 26 ref.

Descriptors: *South America, *Oceans, *Continental shelf, *International law, *Law of the sea, Jurisdiction, Natural resources, Exploration, Exploitation, Foreign countries, Legal aspects, Foreign waters, International waters, Treaties, Commercial fishing, Political aspects, Beds, Ownership of beds, Water rights, Riparian rights, Navigable waters.
Identifiers: *Colombia(SA).

The 1945 Truman Proclamation marked the beginning of many of the Latin American maritime legal problems. The doctrine provided the opportunity for unilateral action by any riparian state to declare increased sovereignty and jurisdiction over contiguous seas and the resources beneath. The present situation thus encompasses a potpourri of individual proclamations by Latin American nations delimiting territorial waters, fishing rights, and continental shelf exploration and exploitation. The main element in common among these proclamations is a desire to extend sovereignty and jurisdiction over the contiguous sea and its resources. Running contrary to this Latin American trend is the position taken by Colombia. Aloofness and idealism best describe Colombia's approach to these problems. Since the Truman Proclamation, Colombia has advocated a fairly steadfast position of restricted sovereignty and jurisdiction over the sea's resources. Colombia has changed and now advocates the 12 mile limit on territorial waters. The end of Colombia's restrictive approach indicates the extent of her frustration and the end of her advocacy of an international maritime regulatory body. (Ritchie-Florida)
W74-10699

FRENCH LAW AND THE POLICY TOWARD POLLUTION IN THE MEDITERRANEAN,
W. V. Brown, II.
In: Sea Grant Publication UNC-SG-73-01, p 198-203, March, 1973. 27 ref.

Descriptors: *Seashores, *Oceans, *International law, *Foreign waters, *Water pollution sources, Oil, Oil pollution, Water pollution, Law of the sea, Foreign countries, Seawater, Water pollution control, Land development, Water management(Applied), International waters, Continental shelf, Land management, Municipalities, Waste water treatment, Waste treatment.
Identifiers: *France, *Mediterranean Sea.

The laws and policy of France are described, as it faces the tragic and rapid metamorphosis of the Mediterranean Sea. Increasing French affluence has led to irreversible development in many of the coastal cities, as hotels and vacation retreats have sprung up at an alarming rate. As a result of this frenzied population increase, the Mediterranean Sea is rapidly becoming one of the most polluted bodies of water in the world. The French government and its municipalities have generally been reluctant to impose strict controls on development because they fear economic losses. There are exceptions. One law that is considered outstanding pollution legislation is the French law of December 16, 1964. It seeks to establish the administrative machinery necessary to protect surface waters, and calls for a water census which would catalogue the quality of all bodies of surface water in France. It also calls for a system of charges to be levied on those responsible for particular instances of water pollution. The discharge of oil into the oceans and seas is of vital concern to coastal nations. Thus France has ratified the Convention on the Prevention of Pollution of the Sea by Oil. (Ritchie-Florida)
W74-10700

ISRAEL'S VIEW OF HER MARITIME LEGAL PROBLEMS,
M. A. Jacobs.
In: Sea Grant Publication UNC-SG-73-01, p 204-208, March, 1973. 28 ref.

Descriptors: *International law, *Law of the Sea, *Foreign countries, *Jurisdiction, *International waters, Canals, Legal aspects, Foreign trade, Foreign waters, Treaties, United Nations, Governments, Political aspects, Access routes, Navigation, Oceans.
Identifiers: *Israel, *Mediterranean Sea.

The concerted effort of the United Nations and a number of its member states to create an international climate conducive to productive negotiations and enlightened concensus, culminating in a widely-accepted convention, is the most vital current development in the Law of the Sea. Maritime legal problems have played a large part in the hostilities of the last quarter century in the Mideast. The Israeli position is described regarding the Suez Canal, the Straits of Tiran and the Gulf of Aqabe. The etiology of the problem and the rationale for Israel's present positions are discussed. Israel has refused to submit to the compulsory jurisdiction of the International Court of Justice regarding the legality of Egypt's closure of the Suez Canal to Israeli ships in 1948. Israel's answer to Egypt's refusal is that there is no judiciable question, the Egyptian act being an obvious violation of customary international law. While Israel can tolerate the closure of the Suez Canal, the Straits of Tiran are necessary for access to East African, Indian and other lucrative trading markets. (Ritchie-Florida)
W74-10701

THE JAPANESE LEGAL APPROACH TO MARINE POLLUTION,
C. E. Alexander.
In: Sea Grant Publication UNC-SG-73-01, p 209-213, March, 1973. 24 ref.

Descriptors: *Water pollution sources, *Oil pollution, *International law, *Foreign countries, *International waters, Law of the Sea, Jurisdiction, Legal aspects, Foreign trade, Governments, Foreign waters, Treaties, Political aspects, Navigation, Water pollution control, Environment, Environmental effects, Regulations, Control, Water management(Applied), Law enforcement, Management, Ecology, Water policy, Water law.
Identifiers: *Japan.

As an island nation Japan must be particularly concerned with the sea and the dangers of ocean pollution. Like other technologically advanced nations, it has not been concerned with pollution control in the past. Because recognition of the danger of ocean pollution is recent, there has been no development of customary international law on sea pollution. Yet there are international conventions on the matter, to which Japan has been a party, such as the 1954 Convention for the Prevention of Pollution of the Sea by Oil and the Convention on Civil Liability for Oil Pollution. Unfortunately the universal cooperation which Japan hopes for is as yet unrealized, so the Japanese government has resorted to anti-pollution legislation of its own. The purpose of a 1970 law is to prevent marine pollution by controlling the discharge into the ocean of oil and wastes from ships and offshore facilities. By securing appropriate disposal of waste oil and by taking measures for the prevention of marine pollution, Japan contributes to the preservation of the marine environment. (Ritchie-Florida)
W74-10702

THE PEOPLE'S REPUBLIC OF CHINA'S VIEW OF CONTEMPORARY MARITIME LEGAL PROBLEMS,
North Carolina Univ., Chapel Hill.
J. Hugenschmidt.
In: Sea Grant Publication UNC-SG-73-01, p 214-222, March, 1973. 47 ref.

Descriptors: *International law, *Law of the Sea, *Foreign countries, *Jurisdiction, *International waters, Legal aspects, Foreign trade, Governments, Foreign waters, Treaties, Political aspects, Navigation, United Nations, Continental shelf, Commercial fishing, Water law, Asia, Economics.
Identifiers: *Republic of China, *Japan.

Historically, China has been land-oriented philosophically, culturally and economically. Occupations associated with foreign trade were culturally disdained. The clash with the irrepressible force of Western trade and resultant cultural impact required the traditional philosophies to accomodate new economic necessities. China's position on maritime legal problems as an extension of its foreign and domestic policies is analyzed. China's original claim to territorial seas was set at three nautical miles in 1930, but was changed to twelve following the problem in 1958 with the United States and Taiwan regarding the offshore islands of Quemoy and Matsu. Although China has never developed into a maritime power, it has developed its coastal fishing industry. Continued expansion will bring conflicts of interest with neighboring nations who seek to exploit the same seas, particularly Japan. Since 1955, Japan and China have entered into several fisheries agreements. China has a broad continental shelf, but the government has made no definitive policy statements regarding its shelf and its resources. (Ritchie-Florida)
W74-10703

PRIMARY ELEMENTS INFLUENCING THE DEVELOPMENT OF THE LEGAL REGIME OF SOVIET TERRITORIAL WATERS,
E. Zumwalt, III.
In: Sea Grant Publication UNC-SG-73-01, p 223-229, March, 1973. 53 ref.

Descriptors: *International law, *Law of the Sea, *Foreign countries, *Jurisdiction, *International waters, Legal aspects, Foreign trade, Governments, Foreign waters, Treaties, Political aspects, Access routes, Bays, Bodies of water, Navigation, Oceans, Access, Economics.
Identifiers: *USSR.

Although several other factors have influenced the development of the legal regime of Soviet territorial waters, its pattern has primarily been the result of national security requirements, economic considerations, and historical tradition. National security has been the most significant factor. Since all the seas bordering the Soviet Union have narrow entrances, access can be easily restricted by hostile nations. In the past the Soviet Union has dealt with its territorial waters as being under its exclusive jurisdiction. It contended that the only rights that foreign ships had were the rights that the Soviet Union granted. In 1958, the Soviet Union ratified the Convention on the Territorial Sea and Contiguous Zone. The Soviet Union thereby subjected itself to the international norm of permitting innocent passage for foreign ships. The Soviets have developed the 'closed sea' and the 'historic bay' doctrines further to restrict the accessibility of foreign nations to Soviet coasts. The principal legal difficulty with the Soviet position is that Soviets refuse to accept the general applicability of these principles to others bodies of water in the world by other nations. (Ritchie-Florida)
W74-10704

WATER BANK ACT.
Committee on Merchant Marine and Fisheries (U. S. House).

H.R. Rep. No. 1307, 91st Cong, 2d Sess (1970). 16 p.

Descriptors: *Habitat improvement, *Watersheds(Basins), *Land management, *Federal government, *Legislation, Water policy, Water law, Water quality control, Wetlands, Wildlife conservation, Watershed management, Flood control, Migratory birds, Marshes, Land use, Water resources development, Government supports, Regulation, Political aspects, Waterfowl conservation, Water management(Applied).
Identifiers: *Water Bank Act.

The House Committee on Merchant Marine and Fisheries recommended passage of the amended House bill known as the Water Bank Act (H.R. 15770). The general purpose of the bill is to preserve and improve habitat for migratory waterfowl and other wildlife resources. The Act will also contribute to flood control and water quality improvement programs. It would authorize the Secretary of Agriculture to make 10-year agreements with owners and managers of wetlands in migratory waterfowl nesting and breeding areas. The agreements would stipulate that the owners not drain, burn, fill or otherwise destroy the wetland character of the lands under contract nor use such lands for agricultural purposes during the contract period. In return, the owners would receive annual payments from the federal government. The payments would vary but would be greater where the public has access for hunting, fishing, trapping, and hiking. The Secretary would be authorized to expend up to $10 million annually in payments. (Deckert-Florida)
W74-10705

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE CLOSED BASIN DIVISION OF THE SAN LUIS VALLEY PROJECT, COLORADO.
Committee on Interior and Insular Affairs (U.S. Senate).
Sen. Rep. No. 947, 92d Cong., 2d Sess. (1972). 16 p.

Descriptors: *Colorado, *Water management(Applied), *Groundwater, *Groundwater resources, *Water supply, Groundwater basins, Water resources, Water resources development, Irrigation, Federal project policy, Water utilization, Wildlife, Recreation, Government finance, Legislation, Federal government, Water reuse, Water shortage, Water requirements.
Identifiers: *San Luis Valley(Colo).

This bill would authorize the Secretary of the Interior to construct, operate and maintain the Closed Basin Division of the San Luis Valley Project in Colorado. The Committee on Interior and Insular Affairs reports favorably on the bill with certain recommended amendments. The project works, which are contemplated to be installed in five stages, would consist of shallow wells and conveyance facilities totaling fifty-five miles of channels and ninety-two miles of well field laterals. The project would salvage an average of 108,000 acre feet of groundwater per year. This water surplus would be available for irrigation and other beneficial uses in Colorado. The new Mishak National Wildlife Refuge is proposed to be established as part of the project and would be furnished with a water supply developed by a separate system. The total construction cost of the Closed Basin Division of the multipurpose water resource project is estimated to be in excess of $18,000,000, of which 90% is allocated to water salvage. The Administration proposed that such costs be made reimbursable, but the Committee determined that to be impracticable. Annual costs for operation and maintenance are estimated to be $355,000. (Ritchie-Florida)
W74-10706

THE NEW LAW ON OCEAN DUMPING, STATUTE AND TREATY,
For primary bibliographic entry see Field 5G.
W74-10707

AMENDMENT OF THE OIL POLLUTION ACT, 1961, (15 STAT. 402), (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10708

THE NATIONAL WATER PERMIT PROGRAM.
Environmental Protection Agency, Washington, D.C. Office of Enforcement and General Counsel.
For primary bibliographic entry see Field 5G.
W74-10709

WATER QUALITY AND OUR FUTURE ENVIRONMENT -- A FEDERATION VIEW,
Duncan, Lagnese, and Associates, Inc., Pittsburgh, Pa.
For primary bibliographic entry see Field 5G.
W74-10710

URBAN CREEKS, A CONDITION OF CRISIS.
Nine-Mile Creek Citizens Committee, Saint Paul, Minn.
For primary bibliographic entry see Field 5G.
W74-10711

IT'S EVERYBODY LAKE,
Michigan Dept. of Natural Resources, Lansing.
For primary bibliographic entry see Field 5G.
W74-10712

SEABED REGIMES AND THE LIMITS OF NATIONAL JURISDICTION,
Miami Univ., Fla. Ocean Law Program.
B. J. Legg.
University of Miami Sea Grant Technical Bulletin, No 19, January 1972. 125 p, 209 ref.

Descriptors: *Continental shelf, *Law of the sea, *Oceans, *International law, Continental slope, Treaties, United Nations, Exploration, Exploitation, Mineralogy, International waters, Jurisdication, Natural resources, Resources development, Legal aspects, Ownership of beds.

Vast deposits of mineral resources important to man exist in the seabed, particularly in the area of the continental shelf. Divergent claims are being made by various nations on the matter of competence to exercise jurisdication over seabed resources. To avoid conflict among nations, proposals have been made for the establishment of a deep seabed regime. Five types of proposals which advocate varying degrees of national or international control are discussed. The five categories are: National Lakes, Res Communis, Flag Nation, United Nations Ownership, and the International Regime. Each of these proposals deal with two essential questions. First, what regime should control exploration and exploitation of seabed resources beyond the limits of national jurisdication. And second, what is the seaward limit of national jurisdication. The three existing interpretations of the width of the continental shelf, the wide shelf interpretation, the narrow shelf interpretation and the intermediate zone concept are discussed. (Flowers-Florida)
W74-10714

REPORT TO THE CONGRESS--WATER POLLUTION ABATEMENT PROGRAM: ASSESSMENT OF FEDERAL AND STATE ENFORCEMENT EFFORTS, ENVIRONMENTAL PROTECTION AGENCY.
Comptroller General of the United States, Washington, D.C.
Report 166506, March 23, 1972. 55 p, 2 append.

Descriptors: *Federal Water Pollution Control Act, *Law enforcement, *Water quality standards, *Federal government, *Adoption of practices, State governments, Governmental interrelations, Water law, Water policy, Water quality control, Governments, Legal aspects, Regulation, Legislation, Rivers and Harbors Act, Florida, Georgia, Indiana, Massachusetts, New Jersey, North Carolina, Administration, Administrative decisions.
Identifiers: Refuse Act of 1899.

In the past both State and Federal efforts to maintain water quality standards had to rely heavily on voluntary compliance rather than enforcement. Since 1970, federal and state programs improved substantially and enforcement actions have been pursued vigorously. While the federal role in enforcement of water quality requirements has expanded, enforcement is still primarily the responsibility of the states. An assessment of federal and state enforcement efforts in Florida, Georgia, Indiana, Massachusetts, New Jersey, and North Carolina indicates that effective enforcement policies should include a close working relationship between the state pollution control agency and the state attorney general's office, and an effective monitoring system to gauge pollution abatement. More cooperation between federal and state control efforts and more efficient enforcement procedures are needed improvements. Legislation to correct these weaknesses is pending in Congress. (Deckert-Florida)
W74-10715

A BILL TO PROVIDE FOR DISASTER ASSISTANCE.
Senate, Washington, D.C.
Sen Bill No 1840, 93d Cong, 1st Sess (1973). 40 p.

Descriptors: *Disasters, *Adoption of practices, *Loans, *Flood plain insurance, *Planning administrative agencies, Water management(Applied), State governments, Economics, Resource allocation credit, Damages, Protection, Compensation, Costs, Federal government, Flood control, Land management, Legislation.

Federal assistance is provided to state and local governments in fulfilling their basic responsibilities for alleviating damage and suffering resulting from disasters. The act is designed to increase coordination of disaster preparedness and assistance programs; to provide federal funds to supplement state and local assistance; to make existing programs more compatible with local needs; to encourage development of comprehensive disaster assistance capabilities; to encourage individuals and state and local governments to obtain insurance coverage; and to encourage hazard mitigation measures. The act is to be administered by the offices of the President and empowers him to direct any federal agency to utilize its resources in support of state and local disaster assistance efforts. Assistance will be provided by using or lending, with or without compensation, equipment, supplies, facilities, personnel, and any other resources; by distributing medicine, food and other consumable supplies; by donating surplus federal equipment and supplies; and by performing services not within the states' capabilities to preserve and protect public health and safety. (Barnes-Florida)
W74-10716

AN ACT AUTHORIZING THE CONSTRUCTION, REPAIR, AND PRESERVATION OF CERTAIN PUBLIC WORKS ON RIVERS AND HARBORS FOR NAVIGATION, FLOOD CONTROL, AND FOR OTHER PURPOSES.
Senate Bill 606, 93d Cong, 1st Sess (1973). 65 p.

Descriptors: *Federal government, *Legislation, *Water resources development, *Project purposes, *Water policy, Navigation, Navigable waters, Structures, Facilities, Planning, Flood

protection, Flood prevention, Administrative agencies, Power plants, Water management, Water quality, Water quality control, Land use, Land development, Land management, Easements, Ecology, Environment, Environmental effects, Fishlife, Wildlife conservation, Wildlife management, Regulations, Standards, Channnels, Pollutants, Disposal, Shores, Shoreline.

Construction, repair and preservation of certain public works on rivers and harbors for navigation, flood control and other purposes are authorized. The Army Corps of Engineers has the duty and responsibility of prosecuting such structures, works and improvements. Hurricane-flood protection and other flood prevention appropriations are authorized as well as certain navigational improvements. The Act further provides for various power installation sites and directs that in development of the several projects, provisions shall be made to assure proper fish and wildlife management, including acquisition of necessary lands or environmental easements. Such easements shall prevent the clearing of the subject land for commercial agricultural purposes or any other purpose inconsistent with wildlife habitat. Also among the provisions are directions to the Corps to remove certain sunken vessels impeding navigation and authorization to clear channels of such trees, roots, debris and other objects which impair safe navigation. The Corps is authorized to operate and maintain models to test proposals affecting the environmental quality of the regions including sanitary intrusion, dispersion of pollutants, water quality, shoreline changes, and others. (Silber-Florida)
W74-10717

POLLUTION CONTROL IN ILLINOIS, THE FORMATIVE YEARS,
Illinois Pollution Control Board, Springfield.
For primary bibliographic entry see Field 5G.
W74-10718

OILY BALLAST DISCHARGE - PROPOSED REQUIREMENTS.
Coast Guard, Washington, D.C.
Federal Register, Vol 38, No 93, p 12749-12750, May 15, 1973.

Descriptors: *Regulation, *Coast guard regulations, *Oil wastes, *Boats, *Water pollution sources, Chemical wastes, Oily water, Waste water disposal, Administrative agency, Standards, United States, Navigation, Oceans, Environmental sanitation, Waste water discharge, Pipelines, Transportation, Waste water pollution, Liquid wastes, Waste disposal.
Identifiers: *Administrative regulations, *Hazardous substances(Pollution), Notice.

The Coast Guard is considering amendments to the oily ballast discharge regulations for all vessels. Interested persons may participate in this proposed rulemaking by submitting data or views. Notice of the proposed rulemaking appeared in the Federal Register February 15, 1973. From comments on the proposal it was obvious that the public was interpreting the amendments as additions to the oil pollution prevention requirements when in fact they were meant to be references to current requirements. In order to correct the misconception of the intent of the regulations, the Coast Guard determined to withdraw the prior proposal, and publish a new proposal that would clearly state the amendment. The amendment covers the operation of tank vessels, of piping systems and appurtenances, and stability, and use of liquid ballast. Regulations are also issued concerning passenger and oceanographic vessels' operations and discharge of liquid ballast. (Sperling-Florida)
W74-10719

CONSENT JUDGEMENTS IN ACTIONS TO ENJOIN DISCHARGES OF POLLUTANTS.
Department of Justice, Washington, D.C.
Federal Register, Vol 38, No 136, p 19029, July 17, 1973.

Descriptors: *Pollutants, *Judicial decisions, *Public access, Pollution discharges, Public rights, Legal aspects, Water law, Pollution abatement, Pollution control, Water quality, Water quality control.
Identifiers: *Injunction.

A policy is established of the Department of Justice of affording an opportunity for public comment before the Department consents to a proposed judgement in an action to enjoin discharges of pollutants into the environment. To accomplish this, each proposed judgement shall be lodged with the court at least thirty days before judgement is entered. Prior to judgment entry, the Department of Justice will receive, consider, and file with the court, any written comments, views, or allegations relating to the proposed judgment. The Justice Department reserves the right to withdraw or withhold its consent to the proposed judgment if it is indicated that the proposed judgment is improper and the Department will oppose an attempt by any person to intervene in the action. The Assistant Attorney General in charge of the Land and Natural Resources Division may establish procedures for implementing this policy. Where the public interest in the policy is not compromised, the Assistant Attorney General may permit an exception to the policy based on extraordinary circumstances. (Proctor-Florida)
W74-10720

MARITIME POLLUTION: THE CANADA SHIPPING ACT AMENDED.
For primary bibliographic entry see Field 5G.
W74-10721

LOCAL INITIATIVE IN POLLUTION CONTROL,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10722

A BILL TO PROMOTE COMMERCE AND PROTECT THE ENVIRONMENT BY ESTABLISHING PROCEDURES FOR THE SITING, CONSTRUCTION, AND OPERATION OF DEEP-WATER PORT FACILITIES OFF THE COAST OF THE UNITED STATES, AND FOR OTHER PURPOSES.
Senate Bill 2232, 93d Cong, 1st Sess (1973). 24 p.

Descriptors: *Federal government, *Legislation, *Oceans, *Ports, *Environmental sanitation, Water policy, Water quality, Public health, Water quality control, Pollution control, Pollution prevention, Wildlife, Navigation, Administrative agencies, Structures, Water management, Water development, Water control, Regulation, Standards, Permits, Marine life, Aquatic life, Coasts, Shores.

The promotion of commerce and the protection of the environment by establishing procedures for the siting, construction, and operation of deep-water port facilities off the coast of the United States is proposed. To protect human health and safety, to prevent damage to the marine environment, and to assure uniform standards, a federal regulatory mechanism is needed to oversee the siting, construction and operation of such deepwater port facilities. Coastal zone development, fisheries, wildlife, navigation and the marine environment need to be assured of proper management, regulation and control while these projects are implemented. The Congressional intent is to authorize these facilities while providing for the fullest protection of the maritime and coastal environment to prevent any adverse impact which might occur as a direct or indirect consequence of the development of such facilities. The National Oceanic and Atmospheric Administration shall certify or deny permits to construct such facilities based upon their appraisal of the consideration enumerated above. (Silber-Florida)
W74-10723

A BILL TO EXTEND ON AN INTERIM BASIS THE JURISDICTION OF THE UNITED STATES OVER CERTAIN OCEAN AREAS AND FISH IN ORDER TO PROTECT THE DOMESTIC FISHING INDUSTRY, AND FOR OTHER PURPOSES.
Senate Bill 1988, 93d Cong, 1st Sess (1973). 7 p.

Descriptors: *Federal government, *Legislation, *Boundaries, *Wildlife conservation, *Fisheries, Water law, Legal aspects, International law, Oceans, Sea water, Fishlife, Industry, Management, Development, Regulations, Control, Standards, Marine life, Aquatic life, Environmental effects, Coasts, Continental shelf, International agreements, Jurisdiction.
Identifiers: Coastal waters.

Valuable coastal and anadromous species of fish and marine life off the shores of the United States are in danger of being seriously depleted, and in some cases, of becoming extinct. Foreign fishing efforts beyond the existing 12-mile fisheries zone near the United States coastline are seriously depleting these fishlife stocks. There is danger of irreversible depletion before efforts to achieve an international agreement on jurisdiction over coastal and anadromous fisheries results in an operative agreement. Therefore it is necessary for the United States to take interim action to protect and conserve overfished stocks and to protect the domestic fishing industry. The Interim Fisheries Zone Extension and Management Act would extend the contiguous fisheries zone of the United States in order to provide proper conservation management until general agreement is reached in international negotiations of law of the sea with respect to the size of such zones and authority over such fish. (Silber-Florida)
W74-10724

ANALYSIS OF POLLUTANTS - PROPOSED TEST PROCEDURES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-10725

UNITED STATES V. BOYD (PROSECUTION OF SHIP CAPTAIN FOR FAILURE TO REPORT OIL DISCHARGE).
491 F 2d 1163 (9th Cir 1973). 8 p.

Descriptors: *Washington, *Oil pollution, *Oil spills, *Ships, *Water quality, Law enforcement, Harbors, Judicial decisions, Cases, Water law, Water quality control, Water quality Standards, Fuels, Water pollution sources, Federal legislation, Legal aspects, Federal government, Regulation, Oily water, Jetsam, Courts, Water policy.

Appelant, captain of a vessel which discharged approximately thirty gallons of oil into the sea while moored, seeks to overturn a conviction for violation of the Water Quality Improvement Act. Under the act the master of any vessel must report to the appropriate agency any oil spill if that spill causes a film or sheen upon the water and is not from a properly functioning engine. Appellant contends the definition of the minimum amount of oil spilled which must be reported is so vague as to render the statute and its implementing regulations void. The court held that the Congress has the power to give an executive agency the construction of rules which set out what amounts of spillage are de minimis and which are of sufficient size as to require reporting. The rules thus flowing from a congressional mandate are presumed to be valid. Defendant has a heavy burden of proof to contest them. The congressional intent was to

create a strong measure against oil spills and the use of such terms as causing a 'sheen upon or discoloration of the surface of the water' represents adequate description of the types of spills to be reported. Congress intended a rigorous control of oil spills, and the definition here are a valid and adequate implementation of that intent. The conviction is sustained. (Salley-Florida)
W74-10727

STATE V. MCFARREN (ACTION TO REQUIRE LANDOWNER TO REMOVE FILL DEPOSITED IN A NAVIGABLE LAKE).
215 N W 2d 459 (Wis 1974).

Descriptors: *Fill(Earth), *Wisconsin, *Judicial decisions, *Legislation, *Water law, Lake shores, Lakes, Boundaries(Property), Adjacent land owners, Legal aspects, High water mark, Shores, Bulkhead line, Appeals, Law enforcement, Penalties(Legal), Riparian rights, Administrative decisions, Court decisions, Water policy, Water management(Applied), Legal aspects, Adoption of practices.
Identifiers: *Evidence.

The plaintiff state of Wisconsin brought suit to enforce an order by the Department of Natural Resources requiring a landowner to remove fill placed on the bottom of a navigable lake. A State statute forbade placing fill on the floor of navigable lakes beyond the bulkhead line, or shoreline. The defendant argued that at the DNR's hearing the State had failed to show either the existence or non-existence of a bulkhead line, and hence DNR failed to establish a major part of its complaint. The State countered that if the defendant wished to use the non-existence of such a line as a defense, the burden was on the defendant to prove that fact. The court held that the State, with superior access to State charts and legislation, must bear the burden of establishing the existence and location of the bulkhead line before it can prosecute for transgressing that line. A second question involved the applicability of using against the defendant the transcripts of criminal proceedings for the use of fill, where the defendant was found not guilty. The court found the transcript to be unnecessary for the DNR hearing. The Court of Appeals reversed the lower court's dismissal of the DNR's petition for an incomplete record. Since the DNR was attempting to protect a valuable natural resource, it should be given the opportunity to bring the required evidence. The case was remanded for further proceedings. (Salley-Florida)
W74-10728

A BILL TO PROHIBIT COMMERCIAL FISHING IN THE WATERS LOCATED IN THE NATIONAL SEASHORE RECREATION AREAS.
House, Washington, D.C.
H R Rep No 11896, 93d Cong, 1st Sess (1973). 2 p.

Descriptors: *Legislation, *Fishing, *Commercial fishing, *Recreation, *National seashores, Sport fishing, Penalties(Legal), Legal aspects, Water law, Water utilization, Shores, Seashores, Recreation demand, Water policy, International law, Treaties.

Commercial fishing would be prohibited in the waters located in the national seashore recreation areas. Notwithstanding any other law, except as provided in this Act, any person who engages in fishing, other than sport fishing, in any water located within the boundaries of any area administered by the Secretary of the Interior as a national seashore, or as a national seashore recreation area, shall be subject to a fine for each day on which he engages in such fishing. Nothing in this Act shall be construed as being in derogation of any rights of any person to fish in any waters pursuant to any valid treaty or other international agreement entered into by the United States prior to the enactment of this Act. (Ritchie-Florida)
W74-10729

DESCRIPTION OF STATE OF GEORGIA'S PROPOSED NPDES PROGRAM.
For primary bibliographic entry see Field 5G.
W74-10731

MARINE RESOURCES -- A NATIONAL PERSPECTIVE,
National Oceanic and Atmospheric Administration, Washington, D.C. Office of Coastal Environment.
R. W. Knecht.
In: Report of the Governors' Conference on Marine Resources, p 9-10, December 17-18, 1973.

Descriptors: *Coasts, *Natural resources, *Conservation, *Water resources, *Resources development, Resource allocation, Marine biology, Estuaries, Recreation, Industry, Harbors, Federal government, State governments, Planning, Environment, Environmental effects, Ecology, Land use, Water management(Applied).
Identifiers: Coastal waters, Coastal zone management.

The dimensions of marine resource problems as well as the Government's role in marine resources are described. In examining marine resources as a concept, one can identify seven essential elements: living resources, non-living resources, a marine transportation and ports dimension, an industrial dimension, an active recreational dimension, a passive recreational dimension, and potential energy resources. There are six elements in the federal role in marine resources: the resource management role, the role in interstate commerce (navigability), the promotion of environmental quality in the coastal areas, the providing of coastal and marine opportunities nationally, the maintenance of an adequate level of national security through the maintenance of the coastal areas of the country, and the role in encouraging states to implement plans for coastal areas pursuant to the Coastal Zone Management Act of 1972. (Ritchie-Florida)
W74-10732

PLAYING TO WIN IN THE DRAINAGE GAME,
W. G. Peterson.
The Minnesota Volunteer, p 44-49, March-April, 1972. 2 illus.

Descriptors: *Minnesota, *Local governments, *Drainage programs, *Ditches, *Legislation, Drainage practices, Drainage effects, Water policy, Excess water, Drainage, Farm management, Environmental effects, Ecology, Water law, Institutional constraints, Administrative agencies, Surface drainage, State governments.
Identifiers: *Administrative regulations, County board, County administration, State statutes, Water rights(Non-riparians).

The Minnesota Drainage Code, loaded with legal credibility gaps, is stacked against the private landowner. A drainage proceeding highlights the roles of the drainage attorney, drainage engineer, 'viewers', and county board. Their interest in the construction of the ditch makes it difficult for them to independently and objectively evaluate its merits. Those opposing the project are discouraged by late notification of the proposal, by the often poor counsel of the county board attorney, and by burdensom expenses of both opposing the ditch and being assessed for its construction. Rarely does the opposition defeat a drainage ditch proposal. Strenuous use of Minnesota's laws for environmental safeguards should be used to fight ditch construction. A permit must be obtained from the Commissioner of Natural Resources when a proposed ditch will affect public waters. The County board must give due consideration of the natural resources affected. Compensation must be paid to the state if the ditch must be constructed despite it being injurious to state conservation lands. Due regard must be paid to the Environmental Rights Act (1971). (Dillingham-Florida)
W74-10733

A GAME PLAN FOR WATER RESOURCES,
Minnesota Dept. of Natural Resources, Saint Paul.
A. D. Chelseth.
The Minnesota Volunteer, p 30-32, January-February, 1973.

Descriptors: *Minnesota, *Administrative agencies, *Water allocation(Policy), *Water resources development, *Water Resources Planning Act, State governments, State jurisdiction, Federal government, Governmental interrelations, Legislation, Water policy, Environmental effects, Water law, Planning, Comprehensive planning, Coordination, Management, Regional development, Research and development, River basin development, Mississippi River basin, Interstate commissions, River systems, Water management(Applied).
Identifiers: *Administrative regulations, *State policy.

Until recently state governments had not developed a water resource planning capability to effectively represent their interests. Minnesota also lacked definitive policies and coordinated state agencies responsible for water resources. In 1965 Congress passed the Water Resources Planning Act (P.L. 89-80) and this situation changed. The Act authorized the creation of a federal-state river basin commission, whose functions were to plan for water resources management on a multi-state, regional basis. Initial coordinating of Minnesota's resource planning was undertaken by the Water Resource Coordinating Committee (WRCC), formed in May 1967. This function will be assumed by the Minnesota Water Resources Council which will coordinate the planning function amongst all state agencies. Primary responsibility for planning will rest with the Bureau of Planning in the Department of Natural Resources (DNR). The DNR will be responsible for collecting water resources data, establishing a central data bank, and inventorying major federal and local goals and proposals for programs affecting the state's water resources. These proposals will be evaluated and reviewed by the legislature. It is necessary to formulate a concise meaningful state policy notwithstanding the difficulty of balancing conflicting interests. (Dillingham-Florida)
W74-10734

(DEATH OF A POND. DEATH OF A RIVER. THE SOUND AND FURY).
For primary bibliographic entry see Field 5G.
W74-10735

UNITED STATES V. 295.90 ACRES OF LAND (EMINENT DOMAIN PROCEEDING INVOLVING MEANDER LINE).
368 F. Supp. 1301-1311 (M.D. Fla. 1974). 11 p,

Descriptors: *Boundary disputes, *Meanders, *Boundaries(Property), *Land tenure, *Florida, Accretion(Legal aspects), Eminent domain, Legal aspects, Judicial decisions, Water law, Government, Patents, Federal government, Real property, Court decisions, Water policy, Land management.
Identifiers: Evidence.

The government instituted an eminent domain proceeding to acquire certain lands on Sanibel Island. A dispute arose over title to some of the land being sought. The disputed parcel was located beyond an erroneous meander line boundary in the original government patent. The claimants argued that they held title based on the rule that land patented with reference to an official survey showing meander lines includes a right to excess land as yet unapportioned. The government claimed an exception to this rule should apply. Where a meander line is shown to be a gross error

tantamount to fraud, any land beyond the meander line is to be treated as unsurveyed land, title to which remains vested with the government. Considering the size of the parcel involved, the intent of the surveyor, and the nature and value of the subject land relative to other conditions surrounding the disputed survey, the District Court held that the exception to the rule should not apply. The court further held that the rule applied even in the absence of proof that a clearly defined body of water exists or previously existed. (Deckert-Florida)
W74-10736

A BILL TO AUTHORIZE PROVISIONS OF THE INTERNATIONAL BOUNDARY AND WATER COMMISSION.
House, Washington, D.C.
H.R. Rep. No. 12834, 93d Cong, 2d Sess (1974). 6 p.

Descriptors: *Legislation, *Colorado River, *Mexican Water Treaty, *Saline water, *Colorado River basin, Desalination, Mexico, Rivers, Irrigation, Drainage, Water users, Inter-agency cooperation, Federal project policy, United States, Drainage areas, Drainage programs, Land management, Water utilization, Treaties, Federal government.

This bill would authorize the measures necessary to carry out the provisions of the International Boundary and Water Commission, concluded pursuant to the Water Treaty of 1944 with Mexico, which deal with the salinity of the Colorado River. The bill authorizes the construction, operation and maintenance of a desalting complex, including a desalting plant and a bypass drain for the discharge of the reject stream from the plant. Appropriate federal agencies must also accelerate cooperative management programs with the Wellton-Mohawk Irrigation and Drainage District. The purpose is to reduce saline drainage flows by improving irrigation efficiency. These agencies are also directed to assist water users in the Wellton-Mohawk District in installing onfarm systems as a means of reducing saline drainage through more efficient irrigation. The Secretary of State, in conjunction with other federal officials and departments, is authorized to acquire lands deemed necessary to implement the Act, which may be cited as the 'International Salinity Control Project, Colorado River'. (Ritchie-Florida)
W74-10737

ECONOMIC IMPLICATIONS OF WATER POLLUTION ABATEMENT IN FAMILY FARM LIVESTOCK PRODUCTION,
Economic Research Service, Urbana, Ill. Farm Production Economics Div.
R. N. Van Arsdall, and J. B. Johnson.
Report ERS-508, December 1972. 44 p, 3 fig, 27 tab.

Descriptors: *Pollution abatement, *Livestock wastes, *Agricultural runoff, *Economic feasibility, *Farm wastes, Legal aspects, Water pollution, Agricultural wastes, Water pollution sources, Farms, Farm units, Farm practices, Legislation, Judicial decisions, Farm management, Waste treatment, Wastes, Illinois, Northeast U.S., Water pollution sources, Environmental effects.
Identifiers: Nuisance(Legal).

The effect of water pollution abatement litigation and legislation on livestock farming in Illinois is discussed. Since family farmers usually have their homes and business together, a high quality environment is important to them, but impediments to change exist such as uncertainty and lack of knowledge regarding alternative pollution abatement systems and environmental quality standards. Lack of economic incentive to change and diseconomies of size make transition to newer technological developments unfeasible and technical assistance is not generally available. Construction and maintenance of pollution abatement facilities, required by existing and pending legislation, will be greatly affected by availability of credit, cost-sharing assistance and tax regulations. The livestock industry has not imposed environmental quality standards because of the lack of economic incentives. Recent cases have held livestock producers, whose effluent flows into streams, to be guilty of a nuisance. A summary of state water pollution statutes that apply to livestock production in the Northeast and North Central regions of the United States is included. (Barnes-Florida)
W74-10738

PROCEEDINGS OF MEETING ON ENVIRONMENTAL POLLUTION (3RD) HELD AT FORT MCNAIR ON 17-18 MAY 1972, SPONSORED BY AMERICAN ORDNANCE ASSOCIATION.
Edgewood Arsenal, Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 5G.
W74-10765

THE MILITARY ATTACKS POLLUTION,
Office of the Deputy Assistant Secretary for Defense for Environmental Quality, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10766

THE ARMY, ITS MILITARY ACTIVITIES, AND THE ENVIRONMENT DURING 1970,
Deputy Chief of Staff for Logistics (Army), Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10767

ENVIRONMENTAL LEGISLATION AND THE AIR FORCE,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10768

NAVAL ENVIRONMENTAL PROTECTION PROGRAM,
Office of the Chief of Naval Operations, Washington, D.C. Environmental Protection Div.
For primary bibliographic entry see Field 5G.
W74-10769

MARITIME ADMINISTRATION POLLUTION ABATEMENT PROGRAM,
Maritime Administration, Washington, D.C., Office of Ship Construction.
For primary bibliographic entry see Field 5G.
W74-10770

ROLE OF COAST GUARD IN POLLUTION CONTROL,
Coast Guard, Washington, D.C. Office of Marine Environment and Systems.
For primary bibliographic entry see Field 5G.
W74-10771

OIL SPILLS, HAZARDOUS MATERIALS SPILLS, VESSEL PROTECTION, AND OCEAN DUMPING,
Edison Water Quality Lab., N.J.
For primary bibliographic entry see Field 5G.
W74-10772

RESEARCH AND DEVELOPMENT ON PREVENTION OF POLLUTION OF THE SEAS BY OIL AND OTHER POLLUTANTS,
Maritime Administration, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5G.
W74-10774

REFUSE ACT PERMIT PROGRAM,
Environmental Protection Agency, Washington, D.C. Office of Refuse Act Programs.
For primary bibliographic entry see Field 5G.
W74-10776

U.S. ARMY ENVIRONMENTAL QUALITY RESEARCH AND DEVELOPMENT PROGRAMS,
Army Research Office, Arlington, Va. Life Sciences Div.
For primary bibliographic entry see Field 5G.
W74-10779

AIR FORCE ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM,
For primary bibliographic entry see Field 5G.
W74-10780

POWER PLANT SITING PROGRAM,
Maryland Dept. of Natural Resources, Annapolis.
For primary bibliographic entry see Field 5G.
W74-10783

LIABILITY FOR HARM FROM UNDERGROUND WASTE DISPOSAL,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 5B.
W74-10870

REGULATION OF SUBSURFACE DISPOSAL IN TEXAS,
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 5B.
W74-10871

OREGON'S SUBMERGED AND SUBMERSIBLE LANDS.
Oregon Advisory Committee to the State Land Board, Salem.
November 15, 1970. 172 p, 6 append, 18 photo, 1 map, 110 ref. OWRR C-2177(No 3378)(2).

Descriptors: *Oregon, *Beds, *Planning, *Ownership of beds, *Riparian rights, Water law, Boundaries(Property), Navigation, Navigable waters, Industries, Recreation, Estuaries, Legislation, Streams, Streambeds, Easements, Fisheries, Accretion(Legal aspects), Avulsion, Public rights, Zoning, Inland waterways.

The project was designed to investigate Oregon's claims to the submerged and submersible lands of its navigable waterways, and to seek solutions to conflicting claims of ownership by private individuals, political subdivisions and industrial groups who are riparian owners on Oregon's navigable waterways. Described are the history of Oregon's acquisition and disposal of its submerged and submersible lands, use of its navigable waterways, the shifting of beds of navigable streams, and the conflicting claims of ownership between the state and various riparian owners. Problems relating to navigation in fields not pre-empted by the federal government, public easements to a common fishery on submersible land conveyed to private ownership, and industrial and recreational uses in Oregon's estuarine resources are also examined. Legislative recommendations are made which hopefully will provide potential solutions to the conflicts and problems encountered. (See also W74-08516) (Ritchie-Florida)
W74-10874

TO AMEND THE WILD AND SCENIC RIVERS ACT.
Committee on Interior and Insular Affairs (U.S. Senate).
Sen. Bill No 921, 93d Cong, 1st Sess (1973). 4 p.

Descriptors: *Wild Rivers Act, *Rivers, *Wild rivers, *Legislation, *Conservation, *Scenery, Aesthetics, Environment, Water policy, Water law, Federal government, Surface waters, Inland waterways, Natural resources, Resources development, River basin development, Land use, Water utilization, Costs, Project planning, Government finance, Environmental effects.

The Secretary of the Interior or the Secretary of Agriculture, or both jointly, shall submit to the President reports on the suitability for addition to the national wild and scenic rivers system of rivers which are designated by the Congress as potential additions to such system. The President shall report to the Congress his recommendations and proposals with respect to the designation of each such river within three complete fiscal years. Priority shall be given to those rivers with respect to which there is the greatest likelihood of developments which, if undertaken, would render the rivers unsuitable for inclusion within the system. Each report shall show the area included within the report, the characteristics which make the area a worthy addition to the system, the current status of land ownership and use in the area and the reasonably foreseeable potential uses of the land and water which would be enhanced if the area were included within the system. Each report shall also estimate the cost to the United States of acquiring and administering the area. (Ritchie-Florida)
W74-10875

AMENDED BILL: IMPLEMENTATION OF CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING WASTES AND OTHER MATTER.
Committee on Merchant Marine and Fisheries (U.S. House).
H.R. Bill No 5450, 93d Cong, 1st Sess, (1973). 5 p.

Descriptors: *Legislation, *Marine biology, *Environment, *Environmental effects, *Water pollution, Water pollution sources, Permits, Waste disposal, Oil, Wastes, Nuclear wastes, Radioactive wastes, Chemical wastes, Ships, Biological warfare, Environmental control, International law, International waters.

This bill would amend the Marine Protection, Research, and Sanctuaries Act of 1972, in order to implement the provisions of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter. Proposed changes include alterations of the definitions of 'material' and 'oil', and the prohibition of loading by any vessel registered in the United States of any radiological, chemical or biological warfare agent, except as may be authorized in a permit, if such loading occurs in the territory of any foreign state not a contracting party to the convention. Except in relation to dredged material, and radiological, chemical and biological warfare agents, permits may be issued where it is determined that dumping will not unreasonably degrade or endanger human health or the marine environment. It is the policy of the Congress that the President shall undertake to seek effective international action and cooperation to ensure that all parties to the convention shall carry out their requirements and obligations under the convention. (Ritchie-Florida)
W74-10876

DEEPWATER PORTS.
H.R. Report No 668, 93d Cong, 1st Sess (1973). 15 p.

Descriptors: *Oil, *Oil industry, *Legislation, *Harbors, *Environmental effects, Excavation, Government finance, Environment, Ecology, Planning, Navigation, Ships, Oil spills, Water pollution, Water pollution sources, Water pollution control, Water quality, Energy, Oil pollution, Import.
Identifiers: *Deepwater ports.

The United States presently faces the possibility of a long-term energy shortage unless steps are taken to conserve the energy available, develop new sources of energy, and attain self-sufficiency in energy. Importation of significant amounts of crude oil and petroleum products is nevertheless expected to continue. If the crude oil and petroleum products are to be imported efficiently and economically, it is necessary that deepwater port facilities be constructed which can accommodate the very large cargo carriers. Alternative solutions would involve higher economic and possibly environmental costs. No other aspect of the import of bulk commodities ranks with the danger of petroleum spills as a source of environmental and ecological damage. The danger of the uncontrolled release of petroleum into the environment arises primarily from accidental collisions, transfer of petroleum from vessels to storage tanks and the possibility of leakage from the tanks themselves. There is no evidence that supertankers present a greater risk than do smaller ships, since the size of a spill can be controlled irrespective of ship size. (Ritchie-Florida)
W74-10877

THE PROBLEM OF OCEANIC RESEARCH: UNITED STATES AND LATIN AMERICAN PERSPECTIVES,
North Carolina Univ., Chapel Hill. School of Law.
J. E. Kilpatrick.
In: Current Aspects of Sea Law, Sea Grant Publication UNC-SG-74-03, p 35-41, March, 1974. 13 ref.

Descriptors: *International law, *Law of the Sea, *Oceans, *International waters, United States, Foreign waters, Research and development, Scientific personnel, Legal aspects, Political aspects, Data collections, Marine biology, Public benefits, Oceanography, Water law, *South America.

One of the complex topics to be resolved by the upcoming Law of the Sea Conference is the status of marine scientific research. For developed nations, the issue is to what protection under international law should marine scientists be entitled, in view of their special research requirements and its benefits to mankind. For developing nations, the issue is what regulation by coastal states of scientific research is necessary to protect and promote special national interests in adjacent ocean areas. The political and legal conflicts underlying these differing approaches, as reflected in the specific declarations or draft treaty articles of the United States and the Latin American countries are examined. The United States, with support from other developed nations such as the Soviet Union, has vigorously defended the freedom of marine research, premised on a recognition of the rising importance of marine research for mankind in general. Recent Law of the Sea declarations by Latin American countries reflect a dominant concern for national sovereignty and economic development. (Ritchie-Florida)
W74-10878

THE JUBILEE OF THE ROYAL COMMISSION STANDARD,
East Suffolk and Norfolk River Authority (England).
For primary bibliographic entry see Field 5G.
W74-10891

WATER LAWS IN USSR,
Himachal Pradesh State Electricity Board, Simla (India).
For primary bibliographic entry see Field 5G.
W74-10893

RIVERS POLLUTION SURVEY IN SCOTLAND IN RETROSPECT AND PROSPECT,
Secretary of State for Scotland, Edinburgh. Scottish Development Dept.
For primary bibliographic entry see Field 5G.
W74-10896

IS THE WATER SAFE TO DRINK. PART I: THE PROBLEM,
Environmental Defense Fund, Washington, D.C. Water Resources Program.
For primary bibliographic entry see Field 5F.
W74-10897

6F. Nonstructural Alternatives

MINNESOTA FLOODS, 1972--COSTS, PROGRAMS AND POLICY IMPLICATIONS,
Minnesota Univ., Minneapolis. Dept. of Agricultural and Applied Economics.
A. R. Hopeman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 352, $7.25 in paper copy, $2.25 in microfiche. Minnesota Dept. of Natural Resources, St. Paul, Bulletin June 1973. 71 p, 1 fig, 8 tab, 22 ref. OWRR B-054-MINN(2).

Descriptors: *Flood damage, *Flood plains, Management, *Costs, *Flood plain insurance, *Minnesota, Water policy, Land use, Human population, Community development.
Identifiers: Social costs.

The costs of flooding in Minnesota are explored with an eye to determining the incidence of the cost of flooding, i.e., who pays flood costs. The study is predicated on the assertion that the incidence of flood costs has a direct bearing on settlement patterns in flood plain areas. Settlement patterns in turn, have a direct bearing upon the magnitude of flood losses. A major objective is to examine public flood policy in light of the 1972 flood experience in Minnesota, and to suggest ways in which Minnesota's flood plain lands can be put to better use. This is to be done by narrowing the divergence between the private costs and social costs of using flood plain land. Since social costs of flooding are frequently not taken into account when private locational decisions are made, flood plain lands will be put to better use if these social costs are minimized. (Walton-Minnesota)
W74-10417

ECONOMICS OF LAND USE REGULATION IN FLOOD HAZARD AREAS,
Minnesota Univ., St. Paul. Agriculture Extension Service.
A. R. Hopeman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 425, $4.00 in paper copy, $2.25 microfiche. Agricultural Extension Service, Univ. of Minn. August 1973. Minnesota Agricultural Economist. No 548, p 1-5, 2 fig, 1 tab. OWRR B-054-MINN(3). 14-31-0001-3601.

Descriptors: Floods, *Costs, Management, *Flood plains, *Minnesota, *Land use, *Regulation, Economics, *Flood control, Institutional constraints.
Identifiers: Flood costs, Social costs, *Flood hazard areas.

To put flood plain lands to their wisest use, a balanced governmental approach is required. Controls are needed so flood plain land is not used in ways that impose external costs on upstream or downstream users. Institutional modifications are needed to induce flood plain occupants to consider the social costs of their locations. Where institutional modification are unfeasible or inadequate, further regulation is in order. Aggressive information dissemination should inform flood plain purchasers about flood hazards. Regulation may be necessary so prospective purchasers are not at the mercy of unscrupulous or uninformed developers. Structural measures may be warranted

in some areas. However, proposals should be evaluated cautiously. Such proposals should be subject to new constraints. Beneficiaries of structural protection works should pay more of the cost. Structural protection works should be combined with land regulation schemes so that the works do not encourage unwise land use. Structural protection works should be used to protect properties having a sound economic reason for being located in flood plain areas. Other land use should be redirected to nonhazardous locations. (Walton-Minnesota)
W74-10529

FLOOD PLAIN INFORMATION--PETERS CREEK, BIRCHWOOD, ALASKA,
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-10684

PRACTICES IN DETENTION OF URBAN STORMWATER RUNOFF,
Poertner (Herbert G.), Bolingbrook, Ill.
For primary bibliographic entry see Field 4A.
W74-10696

6G. Ecologic Impact Of Water Development

TECHNICAL BASIS FOR INTERIM REGIONAL TORNADO CRITERIA,
Atomic Energy Commission, Washington, D.C. Office of Regulation.
For primary bibliographic entry see Field 2B.
W74-10433

RHODE ISLAND'S OCEAN SANDS: MANAGEMENT GUIDELINES FOR SAND AND GRAVEL EXTRACTION IN STATE WATERS,
Rhode Island Univ., Kingston. Coastal Resources Center.
For primary bibliographic entry see Field 5G.
W74-10437

DREDGING AND SPOILING ON LONG ISLAND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 5C.
W74-10439

PALM BEACH COUNTY SEWAGE IMPROVEMENT PROGRAM FLORIDA (FINAL ENVIRONMENTAL STATEMENT).
Environmental Protection Agency, Atlanta, Ga.
For primary bibliographic entry see Field 5D.
W74-10514

SIERRA CLUB V. MASON (MOTION TO VACATE INJUNCTION BARRING HARBOR DREDGING PROJECT).
For primary bibliographic entry see Field 6E.
W74-10522

HARRY S. TRUMAN DAM AND RESERVOIR, OSAGE RIVER, MISSOURI, APPENDIX C, FINAL ENVIRONMENTAL STATEMENT).
Army Engineers District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W74-10523

ENVIRONMENT IMPACT REQUIREMENTS IN THE STATES: NEPA'S OFFSPRING,
Center for California Public Affairs, Claremont.
For primary bibliographic entry see Field 6E.
W74-10527

A METHODOLOGY FOR POWER PLANT SITE SELECTION AT THE RECONNAISSANCE LEVEL,
Long Island Lighting Co., Mineola, N.Y. Environmental Engineering Dept.
M. C. Cordaro, and W. T. Malloy.
Journal of Environmental Systems, Vol 3, No 4, p 257-266, Winter 1973. 1 fig, 6 tab.

Descriptors: *Powerplants, *Sites, *Evaluation, Cooling, *Decision making, *Methodology, Costs, Sea water, Shores, Water resources, Analysis, *New York, Risks.
Identifiers: *Long Island, Judgment, Rating, Screening.

A methodology was developed and applied to identify the principal candidate sites for locating major steam electric generating facilities to serve Long Island. The selection criteria included not only economic and engineering considerations but also social and environmental factors reflecting changing and often intangible public values. The choice of cooling medium for Long Island power plants was seawater; the high cost of piping and the associated environmental impact of inland siting restricted acceptable site choices to near-shore locations. From a total of 68 candidate sites, five sites most suitable for further detailed investigations were selected utilizing a series of steps in which analysis and judgment were combined to overcome the problems of preliminary information and uncertainty: (1) qualification review; (2) preference review; and (3) recommendation review. Unsuitable sites were eliminated on the basis of steps 1 and 2. A refined analysis of the favorable sites revealed patterns of value-free dominance among them. (Bell-Cornell)
W74-10602

PUBLIC WORKS FOR WATER AND POWEER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1975, PART I, PART II.
For primary bibliographic entry see Field 6E.
W74-10697

AMENDMENT OF THE OIL POLLUTION ACT, 1961, (15 STAT. 402), (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10708

A GAME PLAN FOR WATER RESOURCES,
Minnesota Dept. of Natural Resources, Saint Paul.
For primary bibliographic entry see Field 6E.
W74-10734

SOME ENVIRONMENTAL CONSIDERATIONS IN POWER GENERATION,
Burns and Roe, Inc., Oradell, N.J.
For primary bibliographic entry see Field 5G.
W74-10782

POWER PLANT SITING PROGRAM,
Maryland Dept. of Natural Resources, Annapolis.
For primary bibliographic entry see Field 5G.
W74-10783

TO AMEND THE WILD AND SCENIC RIVERS ACT.
Committee on Interior and Insular Affairs (U.S. Senate).
For primary bibliographic entry see Field 6E.
W74-10875

DEEPWATER PORTS.
For primary bibliographic entry see Field 6E.
W74-10877

ENVIRONMENTAL INFLUENCES ON OFFSHORE FACILITIES,
National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
A. R. Hull, and T. S. Austin.
Marine Technology Society Journal, Vol 8, No 4, p 15-21, April-May, 1974. 6 fig, 6 ref.

Descriptors: *Environmental effects, *On-site data collections, *Harbors, *Offshore platforms, *Data collections, Nuclear powerplants, *History.
Identifiers: *Deep water ports.

Environmental data will play a very important role in the planning, site selection, design, construction, and operation of offshore facilities including deep water ports for supertankers. Because of the increasing necessity of energy importation, the United States will be developing three types of offshore facilities: nuclear powerplants, drilling rigs, and supertanker terminals (deep water ports). The specific types of data needed during each phase of development of these facilities, especially deep water ports, are discussed. Some of the categories reviewed included: distance offshore of suitable water depth; storm surge; extreme wave-wind conditions; and severe storm frequency. Cost effectiveness versus protection of the environment is discussed. The availability of historical environmental data from national centers and the need for subsequent on-site observations are examined. Two recent data guidelines developed for potential supertanker ports are reviewed, and the need for more detailed studies is cited. (Shaffer-FIRL)
W74-10898

7. RESOURCES DATA

7A. Network Design

RELIABILITY OF SNOWMELT RUNOFF PREDICTIONS BASED ON MASS BALANCE PROCEDURES VERSUS INDEX METHODS,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 2C.
W74-10536

THE DESIGN OF SAMPLING PROGRAMMES FOR RIVERS AND EFFLUENTS,
Water Pollution Research Lab., Stevenage (England).
H. A. C. Montgomery, and I. C. Hart.
Water Pollution Control, Vol 78, No 1, p 77-101, 1974. 7 fig, 7 tab, 39 ref.

Descriptors: *Sampling, *Rivers, *Effluents, *Water sampling, Time, Flow, Water treatment, Water quality, Water analysis, Methodology, Surveys, Numerical analysis, Mixing, Formulas.
Identifiers: *United Kingdom.

Guidelines for the design of sampling programs for rivers and effluents are discussed based upon a survey of conditions in the United Kingdom. In developing a program, it is advisable to seek various types of average, percentile values, or frequency distribution of concentration or load, as well as individual dual values or sequences of values. Loads and flow weighted concentrations tend to become more useful than time based average concentrations as the flow becomes more variable. Accidental or illegal incidents of short duration cannot be detected with certainty by long term sampling programs. Sampling should be carried out only where lateral or vertical mixing is complete and sampling locations should be numerous enough to allow the results to be interpreted in the manner decided upon. Six samples are tentatively suggested as an appropriate number of characterizing a cyclic fluctuation or a period of persistently high or low concentration. Time of

sampling should either be randomized or arranged so that the frequency of sampling is different from that of any daily, weekly, or other cyclic fluctuation. Formulae are proposed for estimating the number of samples needed to obtain a summary result with a given precision at a given level of confidence. (Merritt-FIRL)
W74-10576

SURFACE WATER SYSTEM -- 1973,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 7C.
W74-10695

7B. Data Acquition

A RAPID AND ACCURATE METHOD FOR THE ANALYSIS OF CALCIUM CARBONATE IN SMALL SAMPLES,
Amherst Coll., Mass. Dept. of Geology.
For primary bibliographic entry see Field 2J.
W74-10366

A SETTLING TUBE SYSTEM FOR SAND-SIZE ANALYSIS,
Northwestern Univ., Evanston. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2J.
W74-10367

AN INVESTIGATION OF ELECTRO-OPTICAL TECHNIQUES FOR THE ANALYSIS OF SUSPENDED SEDIMENTS,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 2J.
W74-10407

MEASUREMENTS OF THE DISTRIBUTION AND VOLUME OF SEA-SURFACE OIL SPILLS USING MULTIFREQUENCY MICROWAVE RADIOMETRY,
Hulbert (E.O) Center for Space Research, Washington, D.C. Space Sciences Div.
For primary bibliographic entry see Field 5B.
W74-10429

INTERPRETATION OF LAND USE AND STREAM ORDER, PAWNEE RIVER BASIN, KANSAS.
Kansas Univ. Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 4A.
W74-10430

ADVANCED X-RAY CRAWLER.
For primary bibliographic entry see Field 8C.
W74-10450

COMPUTERISED SEWERAGE SCHEME.
For primary bibliographic entry see Field 5D.
W74-10476

SAMPLING AND FLOW MEASURING DEVICE,
P. D. Dieterich.
U.S. Patent 3,803,921. Issued April 16, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 3, p 943, April 16, 1974. 1 fig.

Descriptors: *Patents, *Pipes, Analytical techniques, *Water sampling, Pollutant identification, Flow, Measurement, Instrumentation.

A device is described for sampling the fluid flow in a pipe. It is comprised of a probe extending into the flow system. The probe has an outer conduit of blind inner and outer ends extending diametrically across the pipe and having a plurality of laterally spaced openings facing the flow. It also has an inner conduit extending from exterior of the pipe to the axial center of the outer conduit from one end. This provides the sole communication from the interior of the outer conduit to sample gathering means external of the pipe. The lateral openings sample the stream of fluid at several areas across the diameter of the pipe, carrying the respective samples into the interior of the outer conduit which constitutes a mixing plenum, so that a representative sample is drawn off from the inner conduit. Instead of drawing the sample off, the sample is passed through a flow sensor and then returned to the pipe to measure the rate of flow of the fluid. (Murphy-FIRL)
W74-10484

FLUID POLLUTION MONITORING APPARATUS AND METHOD,
For primary bibliographic entry see Field 5A.
W74-10485

MICROBIOLOGICAL WATER SAMPLERS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
A. K. Stolbunov.
Gidrobiol Zh Vol 8, No 5, p 112-118, 1972, Illus.
Identifiers: *Microbiological samples, *Water sampling, Design, *Sampling.

A design is presented for 4 microbiological water samplers which guarantee sterile collection of 1, 2, 3 or a series of water samples from any rigorously prescribed depth with a single lowering.--Copyright 1973, Biological Abstracts, Inc.
W74-10517

APPLICATION OF GROUNDWATER HYDRAULICS TO A BASALTIC WATER-TABLE AQUIFER,
Central Groundwater Board, Nagpur (India).
For primary bibliographic entry see Field 4B.
W74-10569

SENSING OF MOISTURE CONTENT IN SOIL,
Wescor, Inc., Logan, Utah.
For primary bibliographic entry see Field 2G.
W74-10592

ON THE THERMOELECTRIC MEASUREMENT OF WATER TRANSFER IN PLANT STEMS,
For primary bibliographic entry see Field 2I.
W74-10601

COLLECTION AND ANALYSIS OF REMOTELY SENSED DATA FROM THE RHODE RIVER ESTUARY WATERSHED,
Smithsonian Institution, Edgewater, Md. Chesapeake Bay Center for Environmental Studies.
For primary bibliographic entry see Field 2L.
W74-10622

COMPUTER ANALYSIS FOR ACOUSTIC SENSING OF MULTILAYER SEDIMENTS,
New Hampshire Univ., Durham. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2J.
W74-10637

APPLICATION OF GEOPHYSICAL METHODS IN THE INVESTIGATION OF MINERAL AND THERMAL WATERS,
Institute for Geological and Geophysical Research, Belgrade (Yugoslavia).
For primary bibliographic entry see Field 4B.
W74-10645

PHOTO-HYDROLOGICAL RECONNAISSANCE SURVEYS,
International Inst. for Aerial Survey and Earth Sciences, Enschede (Netherlands).
A. M. J. Meijerink.
March 1974. 371 p.

Descriptors: *Aerial photography, *Hydrogeology, *Water storage, *Surveys, *Terrain analysis, Remote sensing, Mapping, Photogrammetry, Water resources, Investigations, Data collections.
Identifiers: *India, *Netherlands.

The application of aerial photographic interpretation to regional hydrologic surveys in data-scarce areas was studied with emphasis on warm, nonhumid climates. The first objective is to arrive at an insight of the nature of the surface- and subsurface hydrological processes within each part of any given area. The second objective is to make an approximate estimate of the relative quantities of locally available water resources. The third objective is to indicate where sediment affects the feasibility of surface storage of water. A fourth objective is the planning of an efficient project hydrological network. The storage concept offers a way of evaluating the influence of landscape features on hydrological processes, and allows the incorporation of the effects of the seasonal variations in meteorological factors. (Knapp-USGS)
W74-10648

EVALUATION OF A HOLLOW SPHERICAL CAVITY WITH A CIRCULAR APERTURE AS A REMOTE SENSOR OF ATMOSPHERIC INDEX OF REFRACTION,
Texas Univ., Austin. Antennas and Propagation Lab.
J. D. Brett, and A. H. LaGrone.
Available from NTIS, Springfield, Va. 22161 as COM-73-11927, Price $2.75 printed copy; $2.25 microfiche. Report No P-53, May 31, 1973. 47 p, 8 fig, 9 ref.

Descriptors: *Remote sensing, *Optical properties, *Air pollution, *Refractivity, Instrumentation, Research and development, *Pollutant identification.

Remote measuring of the index of refraction of the atmosphere was studied using the resonance characteristics of a hollow spherical cavity with apertures. The theoretical study assumed a closed cavity and produced a Q with a bandwidth narrow enough to enable the detection of a change in the index of refraction of the gas filling the cavity of approximately 35 N units. The experimental study produced a minimum detectable change of approximately 320 N units. To produce a feasible system for measuring the index of refraction of the atmosphere a minimum detectable change of no more than 1 N unit would be required. The sensitivity of the proposed system using a hollow spherical resonant cavity with one aperture is far from that required. (Knapp-USGS)
W74-10649

REMOTE SENSING REPORT, SAN FRANCISCO BAY AREA, APRIL-JULY 1972 VOLUME I.
National Field Investigations Center-Denver Colo.
For primary bibliographic entry see Field 5A.
W74-10654

EQUIPMENT FOR MEASURING THE WATER PERMEABILITY AS A FUNCTION OF DEGREE OF SATURATION FOR FROST SUSCEPTIBLE SOILS,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 2G.
W74-10657

USE OF WHATMAN-41 FILTERS IN AIR QUALITY SAMPLING NETWORKS (WITH APPLICATIONS TO ELEMENTAL ANALYSIS),
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 5A.
W74-10666

REFLECTANT INDUCED MODIFICATION OF SOYBEAN CANOPY RADIATION BALANCE: 1. PRELIMINARY TESTS WITH A KAOLINITE REFLECTANT,
Nebraska Univ., Lincoln. Dept. of Agricultural Climatology.
For primary bibliographic entry see Field 2D.
W74-10668

VERIFICATION OF RAINFALL ESTIMATES: AN ANALYSIS OF ACTIVATION PATTERNS OF ADSID AND ACOUSID SEISMIC AND ACOUSTIC INTRUSION SENSORS TO DETERMINE RAINFALL RATES,
Elgin AFB Fla. Air Weather Service.
For primary bibliographic entry see Field 2B.
W74-10674

OPTICAL HOLOGRAPHY APPLICATIONS FOR THE ZERO-G ATMOSPHERIC CLOUD PHYSICS LABORATORY,
National Aeronautics and Space Administration, Huntsville, George C. Marshall Space Flight Center.
For primary bibliographic entry see Field 2B.
W74-10679

AREAL SNOWPACK WATER-EQUIVALENT DETERMINATIONS USING AIRBORNE MEASUREMENTS OF PASSIVE TERRESTRIAL GAMMA RADIATION,
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 2C.
W74-10681

RADAR IN WEATHER MODIFICATION AND HAIL CONTROL,
For primary bibliographic entry see Field 3B.
W74-10687

PROCEDURE AND APPARATUS FOR MEASURING THE ATTENUATION OF RADAR RADIATION IN CLOUDS AND PRECIPITATION,
For primary bibliographic entry see Field 3B.
W74-10688

PROBLEMS OF TECHNICAL REALIZATION OF RADAR MEASUREMENTS OF HAIL,
For primary bibliographic entry see Field 3B.
W74-10689

MECHANISM OF RESPIRATORY EXCHANGES IN AQUATIC ENVIRONMENT: A GENERAL REVIEW INCLUDING PERSONAL RESULTS,
Amiens Univ. (France). Laboratoire de Physiologie.
For primary bibliographic entry see Field 5A.
W74-10713

A QUICK-WEIGHING LYSIMETER SYSTEM CHECK,
Agricultural Research Service, Prosser, Wash. Irrigated Agriculture Research and Extension Center.
J. E. Middleton.
Agricultural Engineering, Vol 53, No 7, p 14-15, July 1972. 1 fig.

Descriptors: *Lysimeters, Instrumentation, Moisture meters, Moisture content, Soil water, Evapotranspiration.

A quick dynamic lysimeter sensitivity check has been developed in which a 5 gallon water-filled container is placed on top of the soil at the center of a lysimeter. A 1/32-inch ID copper tube is soldered into the base of the container to slowly drain the water from the container and away from the lysimeter. Any operational malfunction will be indicated by an irregularity in the plotted time:weight loss curve. (Skogerboe-Colorado State)
W74-10749

MEASUREMENT OF LEAF WATER POTENTIAL IN WHEAT WITH A PRESSURE CHAMBER,
Agricultural Research Service, Mandan, N. Dak. Northern Great Plains Research Center.
For primary bibliographic entry see Field 3F.
W74-10811

RADIOACTIVE ISOTOPES FOR WATER-INPUT PROFILES,
For primary bibliographic entry see Field 8G.
W74-10838

REQUIREMENTS FOR THE MONITORING OF INDUSTRIAL DEEP-WELL WASTE-DISPOSAL SYSTEMS,
Dow Chemical Co., Houston, Tex.
For primary bibliographic entry see Field 5B.
W74-10867

7C. Evaluation, Processing and Publication

A GROUNDWATER QUALITY MODEL: A HYBRID COMPUTER SIMULATION,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 5B.
W74-10352

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 9 AND 10, COLORADO RIVER BASIN AND THE GREAT BASIN.
Geological Survey, Washington, D.C.
Available from Sup Doc, GPO Washington, D.C. 20402 Price $2.35. Water-Supply Paper 2098, 1973. 296 p, 1 fig, 39 ref.

Descriptors: *Water quality, *Data collections, *Hydrologic data, *Surface waters, *Colorado River basin, Water chemistry, Dissolved solids, Suspended load, Pesticides.
Identifiers: *Great basin.

The records of chemical analysis, water temperature, and suspended sediment of surface waters of the Colorado River basin given in this volume serve as a basis for determining the suitability of waters for various uses. Descriptive statements are given for each sampling station where chemical analyses, temperature measurements, or sediment determinations have been made. These statements include location of the station, drainage area, periods of records available, extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling station are included in most tables of analyses. During the water year ending September 30, 1968, the Geological Survey maintained 93 stations on 57 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 73 of these locations for chemical-quality studies. Samples also were collected less frequently at many other points. Water temperatures were measured continuously at 9 and daily at 55 stations. (Knapp-USGS)
W74-10353

WATER RESOURCES INVESTIGATIONS IN ARIZONA, 1973.
Geological Survey, Washington, D.C.
Free upon request to USGS, Washington, D.C. 20244. Water Resources Investigation Folder, 1973. 1 sheet, 9 fig, 1 tab.

Descriptors: *Water resources, *Investigations, *Arizona, Surface waters, Groundwater, Basic data collections, Data collections, Hydrologic data, *Maps.

The water-resources program of the U.S. Geological Survey in Arizona consists of the collection of basic information through its hydrologic-data stations, areal hydrologic and interpretive studies, and research projects. The basic data collected, the results of the areal studies, and the research findings are presented mainly in publications of the U.S. Geological Survey and Arizona agencies, but some appear also in technical journals and other publications. This folder contains a brief description of the water-resources investigations in Arizona in which the U.S. Geological Survey participates, and a list of selected references. (Knapp-USGS)
W74-10362

PRECIPITATION PROBABILITIES FOR EAST TENNESSEE,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 2B.
W74-10399

PRECIPITATION PROBABILITIES FOR MIDDLE TENNESSEE,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 2B
W74-10400

PRECIPITATION PROBABILITIES FOR WEST TENNESSEE,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 2B.
W74-10401

SALINE GROUNDWATERS PRODUCED WITH OIL AND GAS,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 5A.
W74-10411

INTERPRETATION OF LAND USE AND STREAM ORDER, PAWNEE RIVER BASIN, KANSAS.
Kansas Univ. Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 4A.
W74-10430

A RESERVOIR MODEL ALTERNATIVE TO THE UNIT HYDROGRAPH FOR FLOOD ESTIMATION,
Transport and Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 4A.
W74-10432

SUMMARY OF TURBULENCE DATA FROM RIVERS, CONVEYANCE CHANNELS, AND LABORATORY FLUMES,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 8B.
W74-10435

WATER-TABLE CONTOUR MAP, ANCHORAGE AREA, ALASKA,
Geological Survey, Anchorage, Alaska.
L. L. Dearborn, and G. W. Freethey.
Open-file report, 1974. 1 sheet, 1 map.

Descriptors: *Water table, *Alaska, *Maps, Water levels, Groundwater.
Identifiers: *Anchorage(Alaska).

This map shows contours of the water table in the Anchorage area of Alaska. In the map area it generally lies within 30 feet of the land surface. The water-table contours shown are based on the altitude of the water level in wells that just penetrate the water body. Water-level measurements used to prepare this map were made from 1955 to 1973. Seasonal fluctuation of the water table normally ranges between 1 and 4 feet. (Knapp-USGS)
W74-10436

MEASUREMENT OF ENVIRONMENTAL POLLUTION AND ITS SYSTEMIZATION,
Hitachi Ltd., Tokyo (Japan).
For primary bibliographic entry see Field 5A.
W74-10438

INFORMATION STORAGE AND RETRIEVAL SYSTEM FOR WELL HYDROGRAPH DATA USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 4B.
W74-10442

WATERHEAD FORECAST POSSIBILITIES ON HYDRAULIC BASIS,
For primary bibliographic entry see Field 4A.
W74-10453

WATER QUALITY CRITERIA DATA BOOK - VOL. 5 - EFFECTS OF CHEMICALS ON AQUATIC LIFE,
Battelle Columbus Lab., Ohio.
For primary bibliographic entry see Field 5C.
W74-10541

THE ANALYSIS OF SOME MONTHLY HYDROLOGIC TIME SERIES,
Idrutecneco, San Lorenzo in Campo (Italy).
For primary bibliographic entry see Field 2A.
W74-10606

WATER POLLUTION BEING FOUGHT BY COMPUTER.
For primary bibliographic entry see Field 5G.
W74-10610

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 12-16. NORTH PACIFIC SLOPE BASINS, ALASKA, HAWAII, AND OTHER PACIFIC AREAS.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-10616

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PART 7. LOWER MISSISSIPPI RIVER BASIN.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-10617

COLLECTION AND ANALYSIS OF REMOTELY SENSED DATA FROM THE RHODE RIVER ESTUARY WATERSHED,
Smithsonian Institution, Edgewater, Md. Chesapeake Bay Center for Environmental Studies.
For primary bibliographic entry see Field 2L.
W74-10622

METHODS OF EVALUATING THE EFFECT OF A COMPLEX OF HUMAN FACTORS ON WATER RESOURCES AND WATER REGIME OF WATERSHEDS (O METODAKH OTSENKI VLIYANIYA KOMPLEKSA FAKTOROV KHOZYAYSTVENNOY DEYATEL'NOSTI NA VODNYYE RESURSY I VODNYY REZHIM VODOSBOROV),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10627

FLOOD HAZARD ANALYSES, BONNER BRANCH OF THE PECATONICA RIVER, BELMONT, WISCONSIN.
Soil Conservation Service, Madison, Wis.
For primary bibliographic entry see Field 2E.
W74-10635

COMPUTER ANALYSIS FOR ACOUSTIC SENSING OF MULTILAYER SEDIMENTS,
New Hampshire Univ., Durham. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2J.
W74-10637

ATS AMARGOSA TRACER STUDY - PROGRAM MANUAL,
Computer Sciences Corp., Las Vegas, Nev. Scientific Systems Dept.
For primary bibliographic entry see Field 5B.
W74-10638

HYDROLOGIC DATA FOR NORTH CREEK TRINITY RIVER BASIN TEXAS, 1972,
Geological Survey, Austin Tex.
R. M. Slade, Jr.
Open-file report, May 1974. 31 p, 2 fig, 3 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Texas, Rainfall-runoff relationships, Storm runoff, Flood control, Dams, Reservoirs, Data collections, Basic data collections.
Identifiers: North Creek(Tex).

This report contains the rainfall, runoff, and storage data collected during the 1972 water year for the 21.6 sq mi area above the stream-gaging station North Creek near Jacksboro, Texas. The locations of floodwater-retarding structures and hydrologic instrument installations in the area are shown. There are five floodwater-retarding structures in the North Creek study area. These structures have a combined capacity of 4,425 acre-feet and regulate streamflow from 16.3 sq mi or 75% of the study area. The average rainfall during the 1972 water year was 24.03 inches, which is considerably less than the 15-year average of 29.72 inches for the period 1958-72. The yearly mean discharge at the stream-gaging station was 1.91 CFS, compared with the 14-year (1957-70) average of 5.75 CFS prior to the effect caused by the floodwater-retarding structures. The annual runoff from the basin above the stream-gaging station was 1,390 acre-feet. (Knapp-USGS)
W74-10640

WATER AVAILABILITY IN CENTRAL WISCONSIN - AN AREA OF NEAR-SURFACE CRYSTALLINE ROCK,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-10647

PHOTO-HYDROLOGICAL RECONNAISSANCE SURVEYS,
International Inst. for Aerial Survey and Earth Sciences, Enschede (Netherlands).
For primary bibliographic entry see Field 7B.
W74-10648

ONE-DIMENSIONAL ANALYSIS OF HEAT DISSIPATION IN A SIDEARM OF A COOLING LAKE,
Oak Ridge National Lab., Oak Ridge, Tenn.
For primary bibliographic entry see Field 5B.
W74-10651

CHEMICAL DATA FROM OREGON WATERS, 1972,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 5B.
W74-10652

PRELIMINARY STUDY OF THE QUALITY OF WATER IN THE DRAINAGE AREA OF THE JEMEZ RIVER AND RIO GUADALUPE,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5B.
W74-10658

MISSOURI RIVER HYDROLOGY (STREAMFLOW AND TEMPERATURE)--SIOUX CITY, IOWA TO RULO, NEBRASKA,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 2E.
W74-10659

THE STRANGE WORLD OF MISCIBLE DISPLACEMENT,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-10664

RANDOM-ACCESS TECHNIQUE FOR MODULAR BATHYMETRY DATA STORAGE IN A CONTINENTAL-SHELF WAVE-REFRACTION PROGRAM,
National Aeronautics and Space Administration, Langley Station, Langley Research Center.
L. R. Poole.
Available from NTIS, Springfield, Va 22161 as NASA TM X-3018 Price $3.00 printed copy; $2.25 microfiche. Technical Memorandum X-3018, July 1974. 21 p, 6 fig, 1 tab, 1 ref, append.

Descriptors: *Data processing, *Refraction(Water waves), *Data storage and retrieval, *Computer programs, *Bathymetry.
Identifiers: Random-access techniques.

A method for storage and use of bathymetry data was developed for the computer program used in studies of wave refraction at the Langley Research Center and Virginia Institute of Marine Science. The regional bathymetry array was divided into 105 indexed modules which can be read individually into memory in a nonsequential manner from a peripheral file using special random-access subroutines. In running a sample refraction, a 75% decrease in program field length was achieved by using the random-access storage method in comparison with the conventional method of total regional array storage. This field-length decrease was accompanied by a comparative 5% increase in central processing time and a 477% increase in the number of operating-system calls. System cost savings of 68% was achieved by using the random-access storage method. (Knapp-USGS)
W74-10671

FLOOD PLAIN INFORMATION--PETERS CREEK, BIRCHWOOD, ALASKA,
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-10684

OGALLALA AQUIFER WATER-LEVEL DATA, WITH INTERPRETATION, 1965-1974,
High Plains Underground Water Conservation District No. 1, Lubbock, Tex.
For primary bibliographic entry see Field 4B.
W74-10685

SURFACE WATER SYSTEM -- 1973,
Wyoming Univ., Laramie. Water Resources Research Inst.
V. E. Smith.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 550, $4.50 in paper copy, $2.25 in microfiche. Water Resources Series No. 43, January 1974. 111 p, 2 append. OWRR A-001-WYO(67).

Descriptors: *Wyoming, *Computer programs, *Hydrologic data, Data collections, *Data storage and retrieval, Surface waters, *Streamflow, *Average flow, Annual, Duration curves, Frequency analysis, Discharge frequency.

Since the initial development in 1968 of Surface Water Systems (SWS), a computerized system of storage, massage and printout of surface water, numerous additions and revisions have been made. This report updates the previous publication (Embree and Larson, 1970 - See W70-05464) describing the available analyses and data.
W74-10695

DESIGNING. PLUG IN A COMPUTER,
Spotts, Stevens and McCoy, Wyomissing, Pa.
For primary bibliographic entry see Field 5D.
W74-10825

SURFACE TO SUBSURFACE CORRELATION OF COLUMBIA RIVER BASALT USING GEOPHYSICAL DATA IN PARTS OF ADAMS AND FRANKLIN COUNTIES, WASHINGTON,
Washington State Univ., Pullman. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4B.
W74-10858

THE OCCURRENCE OF WATER IN THE PRECAMBRIAN CRYSTALLINE ROCKS OF THE NEW JERSEY HIGHLANDS,
Rutgers. The State Univ., New Brunswick, N.J.
For primary bibliographic entry see Field 4B.
W74-10872

8. ENGINEERING WORKS

8A. Structures

AN EXPERIMENTAL AND THEORETICAL STUDY OF THE FLOW FIELD SURROUNDING A SUCTION PIPE INLET,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
V. J. Apgar, and D. R. Basco.
Available from NTIS, Springfield, Va 22161 as COM-74-10172, Price $3.75 printed copy; $2.25 microfiche. Sea Grant College Report TAMU-SG-74-203 (Center for Dredging Studies Report No 172), October 1973. 71 p, 33 fig, 12 ref, 2 append. NOAA Sea Grant 04-3-158-18.

Descriptors: *Intakes, *Pipes, *Hydraulic design, Mathematical models, Intakes structures, Reservoirs, Hydraulic structures, Outlet works, Spillways, Fluid mechanics, Hydraulics.
Identifiers: Inlets(Suction).

A mathematical model was developed to calculate the flow field around a single suction pipe inlet near a horizontal boundary in an infinite reservoir. The basis for the theoretical approach was potential-flow theory which neglects frictional and viscous effects. For simplicity, a point sink was employed. In order to investigate the actual flow conditions, an experimental apparatus was developed to test a model suction inlet. The inlet was a simple cylindrical pipe placed at various heights from and at an angle to the horizontal boundary. The experimental results conformed to theory for initial flow conditions when viscous effects were small. The viscous effects subsequently caused an altered flow with zones of separation. The resulting flow development negated the value of the potential-flow solution. (Knapp-USGS)
W74-10392

EROSION OF THE NORTH SHORE OF LONG ISLAND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 2J.
W74-10440

SHOTCRETE AT MEXICO CITY,
For primary bibliographic entry see Field 8F.
W74-10452

ANOTHER UNUSUAL SEWERAGE PROBLEM SOLVED WITH DUCTILE IRON PIPE,
Cast Iron Pipe News, Vol 40, No 3, p 8-9, Third Quarter, 1973. 3 fig.

Descriptors: Engineering structures, *Pipes, *Sewers, *Separated sewers, *Metal pipes, Infiltration.
Identifiers: *Ductile iron pipe.

The use of ductile iron pipe in the construction of a new sanitary sewage collection and treatment system for a large lumber mill in Oregon is described. Domestic sewage of the company will be treated in a new stabilization pond and by chlorination. The sanitary sewer system of the mill was deteriorating for a number of years because of excessive crushing wheel loads generated from heavy operating equipment and septic attack. Breaks in the system not only were contributing to the already heavy groundwater infiltration from around the joints, but also prevented the passage of a television camera through the lines for purposes of inspection. The decision to use ductile iron pipe with its high beam strength, its great resistance to crushing, and the water tightness of its push-on joints was based on excessive wheel loads from trucks and heavy equipment, the desire to keep infiltration in the new line to zero, the volcanic type soil conditions with deposits of cinders and cemented gravels, and a high ground water table in the desert area of the mill. The lines were constructed with cast iron tees to connect the six-inch ductile iron services to the eight-inch ductile iron laterals and mains. Tees were also placed at strategic locations in the lines with the six-inch opening plugged for possible future service connections. (Merritt-FIRL)
W74-10455

PRITTLE BROOK DIVERSION TUNNEL,
K. S. Trollop.
The Institution of Municipal Engineers, Vol 101, No 2, p 37-42, February, 1974. 7 fig.

Descriptors: *Tunnelling, *Tunnel construction, *Flood control, Rivers, Storm runoff, Water pollution control.
Identifiers: *United Kingdom(Prittle Brook).

The catchment area of Prittle Brook is described, in addition the the characteristics of the brook itself which is lined with concrete. Severe storms in 1968 caused flooding. Consideration was given to several alternatives for minimizing risks of a similar occurrence in the future. A tunnel diversion scheme was chosen to alleviate conditions during storm flows. The proposed scheme, implementation procedures, and sewers involved are described. The tunnel itself was constructed with little in the way of design problems; mechanical soft rock tunneling procedures were used. Excavation was by rotary drum digger and steering was by hydraulic jack, all built into a shield. The tunnel lining is made of precast concrete blocks with a wedge section forced home by a ram. (Murphy-FIRL)
W74-10482

MOLECULE SEPARATOR,
LKB - Produkter A.B., Bromma (Sweden).
E. R. Ryhage.
U.S. Patent 3,803,811. Issued April 16, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 13, p 914, April 16, 1974. 1 fig.

Descriptors: *Patents, *Separation techniques, Pumps, *Nozzles, Equipment, Pumping.
Identifiers: *Molecular separators, Sweden.

A molecular separator is described which acts according to the jet principle. It consists of at least one separation stage with an evacuation chamber, connected to a pump provided with two coaxially arranged nozzles for the gas phase subject to separation. One of the nozzles is axially displaceable. There is a method of controlling the distance between the nozzles from outside the separator while it is in operation. (Merritt-FIRL)
W74-10491

CORRUGATED DRAINAGE PIPE,
Plastic Tubing, Inc., Roseboro, N.C.
E. J. Maroschak.
U.S. Patent 3,802,202. Issued April 9, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 2, p 498, April 9, 1974. 1 fig.

Descriptors: *Engineering structures, *Pipes, *Drainage engineering, *Plastics, *Patents, Drains, Design, Piping systems(Mechanical).

A corrugated plastic drainage pipe is described. The pipe has spaced apart annular ribs, certain ribs being interrupted and having a set of three circularly arranged spaced apart arcuate rib segments. The segments define a series of three drainage holes positioned between the ends of adjacent rib segments where the rib segments are of such extent and so arranged as to position the drainage holes around the bottom of the pipe. This provides a visual means of aiding in installing the pipe in the ground with all of the drainage holes located below the horizontal center line of the pipe and with the intermediate drainage holes occupying the lowermost position. (Murphy-FIRL)
W74-10499

ON THE VARIANCE OF THE STATIONARY PROBABILITY VECTOR FOR A FINITE DAM,
Australian National Univ., Canberra. Computer Centre.
C. L. Jarvis.
Journal of Hydrology, Vol 21, No 3, p 291-297, 1974. 3 tab, 5 ref.

Descriptors: *Probability, *Dams, *Mathematical models, Streamflow, Numerical analysis, Rivers, *Australia.
Identifiers: *Stationary probability vector, *Ord River(Australia), Netherlands.

A method for estimating the variance of the stationary probability vector for the finite dam is discussed. The method relies upon the constancy of a gradient matrix in the vicinity of the solution and a simple numerical differentiation technique is found to be adequate. An example of the variance calculation is given by applying the method to streamflow data previously used in application of Moran's theory of dam to the Ord River project. (Merritt-FIRL)
W74-10574

SEWERAGE SYSTEMS DESIGN.
For primary bibliographic entry see Field 5D.
W74-10575

SEA WALL CONSTRUCTION,
Seawall Enterprises, Inc., Des Moines, Wash.
B. J. Dickinson.
U.S. Patent No 3,802,205, 7 p, 27 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 921, No 2, p 499, April 9, 1974.

Descriptors: *Patents, *Breakwaters, *Sea walls, *Shore protection, Precast concrete, Steel piles.

A modular sea wall structure utilizes steel beam bearing pilings between and on which are supported modular concrete block units. The pilings are driven as deeply as required to give firm support and the bottommost concrete block unit is positioned between and resting on two adjacent pilings at a preselected depth below or above the bottom surface. The top block is post tensioned and the intermediate blocks are designed along with the other structural components to hold the geometry of the wall. All steel parts, namely, pilings, and pretensioned cables, are sealed or isolated from the corrosive effects of water and air. Flexibility of movement is maintained between component parts such as blocks and pilings. (Sinha-OEIS)
W74-10594

LASER LIGHT USED TO LAY PIPE,
J. Gautreau.
Water Pollution Control, Vol 112, No 1, p 34-35, January, 1974. 1 fig.

Descriptors: Engineering structures, Sewerage, *Sewers, Equipment, *Construction equipment, *Canada.
Identifiers: *Lasers, Quebec.

The application of laser beams for the alignment of sewer pipe, storm drains, and other gravity conduits is discussed. Productivity can be increased by as much as 50 percent, alignment accuracy enhanced to within 1/8 of an inch, and surveying greatly simplified. In laying sewer pipe, both the pipe crew and backhoe operator are guided by a pencil-thin ray of red laser light through or beside the pipe onto a target for precise positioning. One of the lasers currently used in Canada is the Laser-Beam Aligner made by Laser Alignment, Inc. Accuracy of this unit on a Quebec storm drain job was reported as a 6-inch drop along an 0.7 mile long line. Another feature making this model popular is that the average set-up time is only about ten minutes. Once set up, the device operates essentially unattended. (Merritt-FIRL)
W74-10612

LARGE DIAMETER POLYETHYLENE FORGE MAINS INSTALLED QUICKLY,
R. W. Lash.
Public Works, Vol 105, No 1, p 45-47, January, 1973. 4 fig.

Descriptors: Engineering structures, Pipes, *Plastic pipes, *Ohio, *Sewers.
Identifiers: *Polyethylene pipes, *Mains, Fremont(Ohio).

The use of large diameter polyethylene pipe as a sewage force main in Fremont, Ohio, is described. The installation was part of a sewerage system improvement program with the capacity to handle up to 8,000 new homes. Under the double force main design, 12- and 24-inch force mains run from a new pumping station with each main discharging into separate existing gravity sewer manholes located along the main business street. Both force mains start adjacent to each other at the new pumping station and run 1500 feet along the street where the 12-inch force main terminates and the 24-inch pipe continues for another 1,200 feet. The force mains were laid mainly under the sidewalks to minimize excavation in the street and interference from other underground utilities. Due to the design, the project called for many special bends. Polyethylene pipe was chosen over other plastic pipes because it could be installed without the use of special fittings since it can bend at a 45 degree angle without damage. Up to 190 feet of pipe a day was installed. (Merritt-FIRL)
W74-10613

HYDRAULIC MODEL STUDIES OF THE LOW-LEVEL OUTLET WORKS, LG-2 DEVELOPMENT, QUEBEC, CANADA,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 8B.
W74-10636

PRACTICES AND PROBLEMS IN THE CONFINEMENT OF DREDGED MATERIAL IN CORPS OF ENGINEERS PROJECTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 5E.
W74-10665

PRACTICES IN DETENTION OF URBAN STORMWATER RUNOFF,
Poertner (Herbert G.), Bolingbrook, Ill.
For primary bibliographic entry see Field 4A.
W74-10696

PUBLIC WORKS FOR WATER AND POWEER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1975, PART I, PART II.
For primary bibliographic entry see Field 6E.
W74-10697

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE CLOSED BASIN DIVISION OF THE SAN LUIS VALLEY PROJECT, COLORADO.
Committee on Interior and Insular Affairs (U.S. Senate).
For primary bibliographic entry see Field 6E.
W74-10706

PIPE JACKING -- A TECHNIQUE FOR SOFT GROUND TUNNELLING,
Cementation Co. Ltd., Calcutta (India).
N. K. Basu.
Indian Concrete Journal, Vol 47, No 9, p 328-334, 343, 1973. 8 fig, 8 ref.

Descriptors: *Sewers, *Tunnels, *Pipes, Conduits, Engineering structures.
Identifiers: *Jacking, *India(Calcutta), *Pipe jacking.

Pipe jacking is a technique which is extemely useful for the construction of sewer lines, pedestrian subways, and irrigation conduits below ground without disrupting the surface, particularly in the case of soft ground where traditional mining and tunnelling processes may be difficult. The technique of pipe jacking consists in placing prefabricated pipes in the ground by driving them from a pit prepared beforehand. In addition to a detailed explanation of the process and jacking equipment, several examples of the successful use of this method are detailed. It was employed for laying a reinforced concrete sewer, 36.6 meters long and 3 to 3.5 meters in diameter, under railway tracks near Calcutta. It crossed seven meters below the tracks, and hardly interfered with the rail traffic. It was probably the first time a pipe of that size was jacked in India. (Murphy-FIRL)
W74-10821

HOW GEOTHERMAL WELLS ARE DRILLED AND COMPLETED,
Big Chief Drilling Co., Oklahoma City, Okla.
J. Cromling.
World Oil, Vol 177, No 7, p 42-45, December, 1973. 3 fig.

Descriptors: *Geothermal studies, *Geysers, Subsurface water, Steam, *Rotary drilling, Drilling fluids, Drilling equipment, *California.
Identifiers: *Geothermal well completions, *Geothermal well drilling, Imperial Valley(Calif).

Detailed information is presented on surface and downhole drilling equipment, casing design, mud and cement programs, and completion procedures in geothermal areas such as the Imperial Valley of California. The preferred rig consists of a 250,00 pound derrick, the largest hook load, with 300-hp drawworks powered by a 450-hp engine. The casing program consists of a 20-inch conductor set at 110 feet, followed by 13 3/8 inch 48 ppf H-40 surface pipe to a depth of 1050 feet. A 7 7/8 inch hole is then drilled to TD. If the well is a potential producer, the hole is opened to 10 5/8, and a 8 5/8 inch production liner is hung at approximately 900 feet. Fresh water gel-lignite muds are commonly used in the Imperial Valley. No high pressure zones are encountered, and mud weight is maintained for hole stability. Normally, a 7 7/8 inch bit will drill as fast as hole stability and drilling conditions allow. One bit commonly penetrates 1000 feet in 20 hours. Drilling in Geyser areas poses many problems such as crooked holes; directional drilling; excessive drill string torque; and abrasive wear of the drill stem. A typical steam well in Geyser areas costs about $350,000. (Campbell-NWWA)
W74-10860

BASIC DISPOSAL-WELL DESIGN,
Du Pont de Nemours (E.I.) and Co., Wilmington, Del. Engineering Service Div.
For primary bibliographic entry see Field 5B.
W74-10865

DEEP-WELL ACID DISPOSAL--PLANNING AND COMPLETION,
Halliburton Services, Duncan, Okla.
For primary bibliographic entry see Field 5B.
W74-10866

CONTROL OF UNCONSOLIDATED SANDS IN WASTE-DISPOSAL WELLS,
Subsurface Disposal Corp., Houston, Tex.
K. E. Davis, and R. J. Funk.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas, p 112-118 (1971). 4 fig, 3 tab, 9 ref.

Descriptors: *Waste disposal wells, *Sands, Injection wells, Waste disposal, *Underground waste disposal, Screens.
Identifiers: *Sand-control methods, Unconsolidated sands, Sand-control problems.

The increasing use of unconsolidated sands a disposal zones has created a need for better sand control systems. The primary causes of sand-con trol problems in disposal wells are (1) greate completion intervals, (2) intermittent operation o the well, and (3) chemical characteristics of the in jected effluent. In order to prevent sand produc tion in disposal wells, consideration must be give to (1) formation characteristics, (2) completio fluid, (3) type of completion, and (4) completio method. Two universally used methods of sand ex clusion are in-place sand consolidation wit plastics, and the use of gravel packs in conjunctio with sand screens. Sand consolidation has limite application because of the large completion inte vals normally used in disposal wells and becaus of possible chemical reactions with injected e fluent. However, a gravel-pack sand scree

completion generally eliminates the three primary causes of sand production in disposal wells. Factors of prime importance are (1) the drilling and completion fluids, (2) formation grain size and composition, (3) size and amount of gravel, (4) pumping rate, (5) pressure, and (6) gravel concentration. Field and laboratory data show that the method of gravel-pack sand-screen completions can be used successfully over intervals as great as 585 ft (178 m) in unconsolidated Frio sands. (See also W72-14480) (Martino-NWWA)
W74-10868

ENVIRONMENTAL INFLUENCES ON OFFSHORE FACILITIES,
National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
For primary bibliographic entry see Field 6G.
W74-10898

CAN DREDGING BE CONTINUED TO MAINTAIN GREAT LAKES,
Corps of Engineers, Chicago, Ill. North Central Div.
For primary bibliographic entry see Field 6D.
W74-10899

8B. Hydraulics

EFFECT OF A LOW IMPERMEABLE GROIN ON SHOREZONE GEOMETRY AND TEXTURE, POINT MUGU, CALIFORNIA,
California Univ., Los Angeles. Dept. of Geography.
A. R. Orme.
Available from NTIS, Springfield, Va. 22161 as AD-774 309, Price $4.25 printed copy; $2.25 microfiche. Army Coastal Engineering Research Center Final Contract Report, November 13, 1973. 109 p, 24 fig, 23 tab, 9 ref, 1 append. Contract No DACW 72-73-C-007.

Descriptors: *Beaches, *Coastal engineering, *Sediment transport, *Shore protection, *Groins(Structures), Coastal structures, Jetties, Sedimentation, Statistics, Sediment sorting, Littoral drift, Surf, *California.

The effects of a low impermeable groin on the geometry and texture of the adjacent shorezone were studied with an experimental groin near Point Mugu, California. One profile was measured upcoast, the other downcoast. During the time of the study the longshore current flowed upcoast for 90 days and downcoast for 38 days. Weak long-term trends occur toward net fill downcoast and net scour upcoast beyond the end of the groin. The alternating scour and fill experienced by offshore stations along both profiles are transmitted inshore with diminishing magnitude and increasing time lag. Fill occurs offshore before it occurs inshore. Inshore stations continue to scour while awaiting the fill. Factor analyses indicate five zones of sympathetic geometric response to given energy conditions along the profiles. Despite these zones, there is no relationship between individual stations facing one another across the groin, indicating that cross-groin response is independent. Coarser sediments are found on the upcoast side, due to the reworking of winter lag deposits, and toward the berm on both profiles. Better sorting is found on the downcoast side. Trends over the period are weak, and there is no textural correlation between stations on the same side of the groin, nor between stations facing one another across the groin. This again indicates the effect of the groin in generating independent cross-groin responses. Trends at most individual stations, however, show that as sediments become coarser over time so their sorting worsens. (Knapp-USGS)
W74-10358

A FIELD INVESTIGATION OF THE HYDRAULICS AND STABILITY OF CORPUS CHRISTI WATER EXCHANGE PASS, TEXAS,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W74-10361

SEDIMENT TRANSPORT IN RANDOM WAVES,
Delaware Univ., Newark. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W74-10390

AN EXPERIMENTAL AND THEORETICAL STUDY OF THE FLOW FIELD SURROUNDING A SUCTION PIPE INLET,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8A.
W74-10392

SIMILARITY LAWS FOR TURBULENT FLOW OF DILUTE SOLUTIONS OF DRAG-REDUCING POLYMERS,
Naval Ship Research and Development Center, Bethesda, Md.
T. T. Huang.
Available from NTIS, Springfield, Va. 22161 as AD-766 787, Price $3.00 printed copy; $2.25 microfiche. Report 4096, August 1973. 35 p, 14 fig, 1 tab, 42 ref.

Descriptors: *Turbulent flow, *Pipe flow, *Drag, *Polymers, Fluid mechanics, Flow resistance, Hydraulics, Turbulent boundary layers, Organic compounds.
Identifiers: *Drag reduction.

For turbulent boundary layers with dilute polymer solutions, velocity similarity laws based on a four-layer, mean-velocity-profile model were deduced by means of pipe-flow experiments. Drag reduction has three domains: undersaturated, optimal, and oversaturated. The drag reduction does not increase with increasing concentration in the oversaturated domain where a strong interactive layer dominates the entire linear logarithmic region of the boundary layer. Drag reduction increases with increasing concentration in the undersaturated domain where the four-layer profile exists in the boundary layer. The boundary between the two domains gives optimal drag reduction; it is determined by the polymer type and concentration and by a Reynolds number based on shear velocity and boundary-layer thickness. Pipe-flow experiments have been made to study the drag-reduction characteristics in the undersaturated domain. The effects of solvent temperature, pipe diameter, polymer type and concentration, and wall shear stress on the measured drag reduction were also investigated. (Knapp-USGS)
W74-10426

THE INFLUENCE OF THE CHEMICAL NATURE OF POLYMERS ON THEIR DRAG REDUCTION CHARACTERISTICS,
Hydronautics, Inc., Laurel, Md.
M. A. Frommer, A. Lavy, M. Kraus, and C. Elata.
Available from NTIS, Springfield, Va. 22161 as AD-766 799, Price $3.00 printed copy; $2.25 microfiche. Technical Report 7213-1, June 1973. 28 p, 4 fig, 7 tab, 19 ref, append. ONR Contract N00014-72-C-0510.

Descriptors: *Drag, *Polymers, Fluid mechanics, Flow resistance, Hydraulics, Turbulent boundary layers, Chemical properties, *Molecular structure, Organic compounds.
Identifiers: *Drag reduction.

The effects of molecular characteristics of water soluble polymers on drag reduction were investigated by studying changes in the drag reduction efficiency of long chain vinylic polymers having an identical polymeric backbone with changes in the chemical nature of their functional groups and by studying the effect of conformational changes of a single polymer on its drag reduction efficiency. Conformational changes may be brought about in many vinylic chain polymers by changing the pH or adding salt to the solution. The polymers studied were polyacrylamide, hydrolyzed polyacrylamide, polyacrylhydrazide, and polystyrene sulfonate. Increase of pH in aqueous solutions of hydrolyzed polyacrylamide from 2 to 8 results in a marked increase of drag reduction. Addition of NaCl and BaC12 to aqueous solutions results in a decrease of drag reduction efficiency. The effect of BaC12 is much greater than that of NaCl in decreasing drag reduction efficiency. Drag reduction efficiency of a polymer in solution increases when its conformation is changed, so that the molecule becomes more extended. (Knapp-USGS)
W74-10427

SUMMARY OF TURBULENCE DATA FROM RIVERS, CONVEYANCE CHANNELS, AND LABORATORY FLUMES,
Geological Survey, Washington, D.C.
R. S. McQuivey.
Available from Sup Doc, GPO, Washington, DC 20402, price $1.55. Professional Paper 802-B, 1973. 66 p, 40 fig, 12 tab, 13 ref.

Descriptors: *Turbulence, *Open channel flow, *Turbulent flow, *Alluvial channels, *Sediment transport, Bed load, Suspended load, Vortices, Flumes, Rivers, Estuaries, Hydraulics, Data collections, Hydrologic data.

Turbulence characteristics of turbulent shear flow were obtained by use of hot-film anemometry. Related hydraulic and sediment data were also collected. Data were collected from the study of flow in 20-centimeter, 2-foot, 4-foot, and 8-foot-wide recirculating flumes, over rigid and alluvial boundaries. Alluvial boundary data were also collected in the Atrisco feeder canal near Bernalillo, N. Mex., the Rio Grande conveyance channel near Bernardo, N. Mex., the Columbia River estuary near Astoria, Oreg., the Missouri River near Omaha, Nebr., and the Mississippi River near Vicksburg, Miss. The longtitudinal and vertical components of the turbulent intensity, the macroscale and microscale of turbulence, the Eulerian integral time scale, the measured turbulent shear stress, the local mean velocities, the slope, the depth, the width, the discharge, the temperature, the suspended-sediment concentration, and the total bed-material discharge. Some longitudinal turbulence intensities were obtained from a standard Price current meter and a small propeller meter at three of the field locations. These data are reported along with the hot-film anemometer measurements. (Knapp-USGS)
W74-10435

CHANNEL NETWORK SIMULATIONS,
IBM Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 4A.
W74-10443

NOMOGRAPHS CALCULATE DISCHARGE FROM OPEN, HORIZONTAL PIPE,
A. Zanker.
Heating/Piping/Air Conditioning, Vol 46, No 4, p 69-70, April, 1974. 3 fig.

Descriptors: *Environmental engineering, Hydraulics, *Discharge(Water), *Pipes, Mathematical models, Model studies.
Identifiers: *California pipe flow method, *Nomographs.

The California pipe flow method for estimating the discharge of water requires that a pipe be horizontal and at least six pipe diameters in length. No orifice or nozzle is required for this method, and the only two necessary measurements are the inside diameter of the pipe, and the distance from the inside top of the pipe to the surface of the flowing water. Although the California method is very simple, it may become troublesome to calculate because of the fractional exponents involved. Two nomographs are given which solve the equation within a matter of seconds. (Murphy-FIRL)
W74-10457

ON THE VARIANCE OF THE STATIONARY PROBABILITY VECTOR FOR A FINITE DAM,
Australian National Univ., Canberra. Computer Centre.
For primary bibliographic entry see Field 8A.
W74-10574

METHOD AND APPARATUS FOR DAMPING WAVE ACTION,
Offshore Co., Houston, Tex. (assignee)
F. A. Bryant.
U S Patent No 3,803,849, 3 p, 4 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 924, April 16, 1974.

Descriptors: *Patents, Pollution, *Bubbles, *Shore protection, Equipment, Air, Barriers.
Identifiers: *Wave action, Wave energy, *Damping.

Damping of wave action is achieved when air is injected into the water as discrete, minute bubbles. A compressor is connected to the bubble generating assembly by a duct or hose to deliver the air to the assembly for injection into the water. The apparatus includes an elongate manifold, a support bar and bubble generating elements. (Sinha-OEIS)
W74-10590

SEA WALL CONSTRUCTION,
Seawall Enterprises, Inc., Des Moines, Wash.
For primary bibliographic entry see Field 8A.
W74-10594

SEWER LINE DESIGN BASED ON CRITICAL SHEAR STRESS,
West Pakistan Univ. of Engineering and Technology, Lahore. Dept. of Sanitary Engineering.
K. M. Yao.
Journal of the Environmental Engineering Division, American Society of Civil Engineers Vol 100, No EE2, p 507-520, April, 1974. 8 fig, 14 ref.

Descriptors: *Model studies, *Mathematical models, *Sewers, Hydraulics, Engineering structures, *Design.
Identifiers: *Critical shear stress.

Practical aspects in applying the critical shear stress approach for the hydraulic design of circular sewers were investigated. The minimum velocity approach was compared to the critical shear stress approach in terms of their effectiveness in achieving self-cleaning action, and their relative effects on the engineering design. Also, a procedure was developed for the application of the critical shear stress approach in practical design of circular sewers. The following conclusions were reached: a critical shear stress in the range of 0.02 psf to 0.04 psf seems to be adequate for sanitary sewers, while 0.06 psf to 0.08 psf applies to storm sewers; design equations based on Manning's formula have been developed using the critical shear stress approach; using a constant minimum velocity for all sewer sizes tends to underdesign large sewers and overdesign small ones; critical shear stress approach provides a more economical design in the case of partially full flow with the flow depth less than 0.4 of the sewer diameter; a design chart and a proposed design procedure are provided for practical use using the design equations for the critical shear stress approach. (Murphy-FIRL)
W74-10611

HYDRAULIC MODEL STUDIES OF THE LOW-LEVEL OUTLET WORKS, LG-2 DEVELOPMENT, QUEBEC, CANADA,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
D. Colgate.
Available from NTIS, Springfield, Va. 22161 as PB-228 192, Price $3.25 printed copy; $2.25 microfiche. Report REC-ERC-74-3, January 1974. 26 p, 27 fig, 3 tab, 2 ref. USBR Contract 14-06-D-7406.

Descriptors: *Outlets, *Hydraulic models, *Energy dissipation, Hydraulic jump, Spillways, Hydraulics, Hydraulic design, Hydraulic equipment, *Valves, Hydraulic valves, Canada.
Identifiers: Howell-Bunger valves.

The outlet works of the LG-2 power development in Quebec were studied using a 1:16 scale model. The energy dissipator includes a deflector ring and baffle piers in a steel-lined oval section downstream from the two 96-inch Howell-Bunger valves. The energy dissipator section is followed by a flat-bottomed tunnel. Operation was improved by moving the deflector ring downstream from its original locations and substituting small floor baffles for the large baffles of the preliminary design. The elevation of the valves was satisfactory and velocities in the unlined portion of the tunnel were within acceptable limits. Data were obtained for computation of required tunnel air supply and for structural design of the deflector ring and energy dissipator walls. (Knapp-USGS)
W74-10636

AN INTEGRATED MODEL OF STORM-GENERATED WAVES,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 2E.
W74-10653

SIMPLE METHOD FOR PREDICTING DISPERSION IN STREAMS,
Geological Survey, Bay Saint Louis, Miss.
For primary bibliographic entry see Field 5B.
W74-10676

8C. Hydraulic Machinery

TEST AND EVALUATION OF AN 80,000 GPD REVERSE OSMOSIS SEAWATER DESALINATION PLANT MOUNTED ON AN AMMI PONTOON,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 3A.
W74-10405

TEST AND EVALUATION OF OIL POLLUTION ABATEMENT DEVICES FOR SHIPBOARD USE, PHASE II,
Coast Guard, Washington, D.C. Naval Engineering Div.
For primary bibliographic entry see Field 5D.
W74-10444

ADVANCED X-RAY CRAWLER.
Anti-Corrosion, Vol 21, No 2, p 17, February, 1974. 1 fig.

Descriptors: *Pipelines, X-rays, *Pipes, Equipment, *Measurement.
Identifiers: *X-ray crawler, *Radiography, *United Kingdom.

Criterion Ltd. of Hitchin, Herts has built an advanced X-ray crawler for pipeline radiography of 20 in diameter pipes and above. One major feature is a central steel chassis with three afixed parts to give added strength with a rigid frame. This enables the crawler to be easily lifted into and out of pipelines. The component parts are in x-ray tube, an electric motor, a drive mechanism, an electronic brain and a rechargeable battery unit. The crawler is remotely controlled and may be dispatched in forward or reverse. (Prague-FIRL)
W74-10450

DAMAGED SEWAGE PIPE REMOVED BY DIAMOND SAWING,
Industrial Diamond Review, p 102-103, March, 1974. 4 fig.

Descriptors: *Sewers, *Pipes, *Concrete pipes, Engineering structures.
Identifiers: *Diamond sawing.

During the process of aligning eight-foot long by 108 inch od sections of concrete sewer pipe underground, one of the lead sections was accidentally damaged. The problem of removing the damaged section in the shortest possible time was solved by diamond sawing. The pipes were being aligned with hydraulic jacks when one of the units in the lead section was badly mangled. It was felt that jackhammers would be too slow. A standard wall saw unit was adapted for sawing the circular surface by a firm that specializes in sawing and drilling concrete structures. A rig was adapted to the inside of the large pipe and was operated by a two-man crew. A 20-inch diameter diamond blade made an initial slice, followed by a 26-inch blade that cut through the final two inches. The saw was powered by a nine hp motor; the blades rotated at 1400 rpm, and were water cooled. (Murphy-FIRL)
W74-10458

PRESSURE SEWER DEMONSTRATION,
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 5D.
W74-10463

SLURRY PUMP,
Dow Chemical Co., Midland, Mich.
M. F. Katzer, and W. G. Routson.
U.S. Patent 3,804,556. Issued April 16, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 3, p 1105-1106, April 16, 1974. 1 fig.

Descriptors: *Pumps, *Patents, *Mud, *Slurries, Silt, Pistons, Equipment.
Identifiers: Cylinders.

A two cylinder pump adaptable to pump mud and silt or other slurried material is described. While one cylinder is pumping, the other is filling with mud. Each cylinder has a piston in it which separates the mud from the hydraulic fluid (oil or oil-water). The hydraulic fluid is pumped out of one cylinder and into the other. The floating piston is drawn away from one end of the first cylinder, thereby drawing in the mud under vacuum plus the differential barometric head. At the same time an equal volume of hydraulic fluid is pumped into the other cylinder causing the piston to eject mud through a mud line. At the moment that one piston reaches one extreme of its stroke, the other one reaches the other extreme of its stroke. At this moment there is a switching of the direction of flow of the fluid and the discharge of the mud from one cylinder to the other. This fluid reversal and shifting will generally take place several times per minute. (Merritt-FIRL)
W74-10488

FILAMENT WOUND REVERSE OSMOSIS TUBES,
Secretary of the Interior, Washington, D.C. (assignee)

B. M. Riggleman, and W. L. Young, III.
U.S. Patent 3,804,259. Issued April 16, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 3, p 1029, April 16, 1974. 1 fig.

Descriptors: *Patents, *Tubes, *Reverse osmosis, *Resins, *Membranes.
Identifiers: Filaments.

An improved resin bonded filament wound support tube for membranes used in reverse osmosis processes is described. The support tube is in the form of a curved composite structure and contains at least 20-30% by weight of a thermosetting resin. The tube has interior plies of helical filament windings which result in a smooth interior surface for the tube and high strength. (Merritt-FIRL)
W74-10490

WATER PURIFYING DEVICE,
Matsushita Electric Industrial Co., Ltd., Osaka (Japan).
For primary bibliographic entry see Field 5D.
W74-10492

SAFETY INSTALLATIONS FOR THE PREVENTION OF POLLUTION THROUGH LEAKAGE IN A PIPELINE,
For primary bibliographic entry see Field 5D.
W74-10494

AUTOMATIC IRRIGATION SUPPLY SEQUENCING VALVE,
Mauna Kea Sugar Co., Hilo, Hawaii.
For primary bibliographic entry see Field 3F.
W74-10757

AUTOMATED FURROW IRRIGATION,
For primary bibliographic entry see Field 3F.
W74-10759

JET PUMP STOPS SAND CLOGGING,
Williston Water Dept., N. Dak.
B. Shaw.
Water Works and Wastes Engineering, Vol 1, No 12, p 52-53, December 1964. 2 fig.

Descriptors: *Pumps, *Screens, Surface waters, Water quality, Jets, Filtration, Treatment facilities.
Identifiers: *Jet pumps, *Sand clogging, Traveling screen, Filtration plant.

The construction and installation are described of a large jet pump at a filtration plant located 30 miles downstream from the confluence of the Yellowstone and Missouri Rivers. The Yellowstone River introduces a large amount of suspended particles into the Missouri at their confluence and it becomes necessary to contend with and ultimately filter the debris at water plants below the confluence. In conventional pump systems, heavy sand settling in the well completely clogs the traveling screen and it becomes ineffective in freeing the well of floating debris. The installation of a jet pump alleviates the problem. The jet pump uses an agitator system of high water pressure that frees the intake line of debris, unclogs the traveling screen, and at the same time, moves floating debris into the screen. (Campbell-NWWA)
W74-10831

READING PUMP CURVES,
Oklahoma State Univ., Stillwater.
R. N. DeVries.
Journal of the American Water Works Association, Vol 65, No 6, p 442-444, June 1973. 4 fig.

Descriptors: *Pressure, Impellers, Pumps, Turbines, Centrifugal pumps, *Curves.
Identifiers: *Pump curves.

Pump curves are an invaluable aid in the selection and operation of pumps. The reading and comprehension of these curves are not difficult once a basic understanding of pump-curve terms and their interrelationships has been gained. When using pump curves for selecting a pump, the operator should look first at the steepness of the head-capacity curve. He should match the slope to his situation. For example, if he has requirements for variable discharges and discharge pressure, he should use a pump with a steep curve. Conversely, a pump with a flat curve should be used for constant discharge and head conditions. Secondly, the operator should look at the power and efficiency curves. The pump operates most efficiently in a small range of discharges. If a pump cannot be found to fit the requirements at the common motor speed, then the operator should look at other speeds or a variable-speed-drive motor. (Staplin-NWWA)
W74-10833

WELL AND PUMP CORROSION,
Layne and Bowler, Inc., Memphis, Tenn. Layne Research Div.
For primary bibliographic entry see Field 8G.
W74-10837

WELLSITE DIAGNOSIS OF PUMPING PROBLEMS USING MINICOMPUTERS,
K. G. Gibbs, and R. H. Nolen.
Journal of Petroleum Technology, Vol 25, p 1319-1323, September 1973. 6 fig, 2 tab, 11 ref.

Descriptors: Pumping, Computers, *On-site tests.
Identifiers: Sucker rod diagnosis, *Minicomputers, Wellsite diagnosis, Pumping problems, *Down-hole conditions, Surface data.

A truck-mounted computer system greatly enhances the efficiency of the sucker rod technique at the wellsite. A brief theoretical review of the diagnostic technique which uses surface data to deduce down-hole conditions is presented, and the computer hardware used in the analysis is described. Examples include: the analysis of surface equipment; the analysis of rod loading; the evaluation of down-hole pump conditions; and, the determination of well potential. The main advantage of this system is that it offers definitive and timely results that can be obtained efficiently, and at a low cost of application. (Campbell-NWWA)
W74-10840

TURBINE CHECK-OUT MADE SIMPLE,
R. L. Jerry.
Water and Pollution Control, p 44-45, March 1966.

Descriptors: *Steam turbines, *Maintenance, Repairing.
Identifiers: *Turbine check-out.

Steam turbines, in good operating order, are almost silent and devoid of tremor and vibration. Presence of either is a signal for immediate shutdown to prevent further damage. After shutdown, the turbine should be stripped and checked-out for damage and excessive wear. Stripping a steam turbine is relatively problem free, provided there is sufficient hoist and overhead crane equipment to accommodate removal of the housing top. Removal of the housing cover exposes the rotors, stator, thrust collar and bearing assemblies. Both the front and rear bearing assemblies should be checked for wear, and the thrust collar checked for tightness. In particular, the flanges within the bearing assembly should be checked for irregularities and nicks. The check-out should proceed with the removal of the main shaft exposing the lower bearing halves. Turbine vanes should be inspected for wear and residue coating. During reassembling of the turbine, care should be taken to equalize flange stresses, and to replace all gaskets. (Campbell-NWWA)
W74-10841

PUMP SELECTION - A MANUFACTURERS VIEWPOINT,
R. F. Dennis.
Water and Pollution Control, p 36, September 1966. 1 fig.

Descriptors: *Pumps, *Centrifugal pumps, *Hydraulic equipment, Hydraulics.
Identifiers: *Pump selection, System head curve, Performance curve, Net positive suction head.

To obtain the proper centrifugal pump for an individual well, it is essential to supply the manufacturer with the following facts: (1) type of service; (2) material to be pumped; (3) amount and size of solids; (4) operating temperature; (5) operating pressure; (6) capacity; and, (7) head. In particular, the best pump for a given job is critically dependent upon the system head curve (S.H.C.). The proper pump selection is made by comparing the S.H.C. to the performance curve. The pump rating is the point of intersection of S.H.C. and performance curve. Often pumps fail to meet design conditions because there is insufficient net positive suction head available. To insure that no cavitation, air binding, loss of prime, or erosion of impeller and casing occur, the net positive suction head available must be at least equal to, or greater than that required by the pump. (Staplin-NWWA)
W74-10842

CORROSION CONTROL ON BOREHOLE WATER PUMPS,
Water Planning for Israel Ltd., Tel-Aviv.
For primary bibliographic entry see Field 8G.
W74-10844

ELECTRICALLY GROUNDED FRP SYSTEMS,
FMC Corp., Front Royal, Va.
J. H. Mallinson.
Materials Protection and Performance, Vol 13, No 12, p 26-28, December 1973. 2 tab, 4 ref.

Descriptors: Electric currents, Conductivity, Conductors, *Electrical grounding, Electrical conductance, Plastics.
Identifiers: *Fiberglass(Reinforced plastic), Electrically grounded laminates.

The nature of electrically grounded laminates is described and results are outlined of preliminary tests on a graphite fiber corrosion resistant laminate. Liquids flowing through a pipe often generate static electricity. If the charge is sufficient, a spark will jump to a source of lower potential, and become a source for an explosion if volatile gases or vapors are present. Many processes involving heavy humidification constantly cover all surfaces with a film of water, providing the system with a potential natural ground. However, to totally rely on wetted surfaces as a ground can be dangerous. The safest course is to provide for a complete and adequate ground regardless of the degree of humidification, or the conductivity of existing solutions in contact with the structure. Experience has shown that the nonconductive, fiberglass reinforced plastic (FRP) laminates used on many tanks and duct systems can be electrically grounded by adding finely ground carbon to the resin system. (Martino-NWWA)
W74-10845

ROCK CUTTING BY IMPACT ACTION,
Nottingham Univ. (England). Dept. of Mining Engineering.
B. N. Whittaker, and A. B. Szwilski.
International Journal of Rock Mechanics, Mineral Science and Geomechanical Abstracts, Vol 10, p 659-671, 1973.

Descriptors: Rock properties, *Rock mechanics, Rock excavation, Tensile stress.
Identifiers: Rock cutting, *Impact ripping, Impact cutting, Linear cutting, *Tensile splitting theory.

The principles of rock cutting are reviewed and differentiation made between linear and impact cutting. Theoretical aspects of cutting are discussed with particular reference to the tensile splitting theory. The role played by the rock fabric in relation to its cutting characteristics is examined. Consideration is given to how a rock's impact cutting property can be established and to this end a description is given of an experimental rig designed to test different rock types. Results from a study with the impact cutting rig are presented and discussed. It is concluded that this form of test is of great value in comparing the impact cutting properties of different rocks. The practical implications of the results are discussed, in particular their bearing on the design aspects of current rock cutting machines. (Campbell-NWWA)
W74-10847

A THEORY OF HYDRAULIC ROCK CUTTING,
Flow Research, Inc., Kent, Wash.
S. C. Crow.
International Journal of Rock Mechanics, Mining Science and Geomechanical Abstracts, Vol 10, p 567-584, 1973. 8 fig, 11 ref.

Descriptors: Rock excavation, Rock properties, Permeability, Cavitation, Fluid mechanics, Pressure, *Hydraulics.
Identifiers: *Water jets, Jet stream, *Wilkeson sandstone, Grains, *Hydraulic rock cutting.

Water jets having total pressures above 1000 atm are attractive tools for cutting rock. A theory is developed to explain the cutting action. The rock is assumed to translate at a speed under a continuous jet. The problem is to determine the depth of the resulting slot as a function of feed rate, diameter and total pressure of the jet, and the relevant properties of the rock. The jet exerts traction against a cutting surface at the leading edge of the slot, and the traction induces continuous fracture. Cavitation tends to sheath the cutting surface in vapor, but curvature of the jet stream causes a high surface pressure, which closes the cavity bubbles and exposes the grains to direct impact from the water. The surface pressure would suffice to keep the grains in place, but permeability allows the water to penetrate beneath the cutting surface and relieve the pressure across the grains. A theory is presented for the intrinsic speed of rock-cutting, once permeability has occurred. The theory is compared to preliminary data spanning a three-decade range of feed rate, and the comparison is highly encouraging. (Staplin-NWWA)
W74-10848

FOOTAGE, TRIP TIME ARE FACTORS IN CHOICE OF DOWNHOLE MOTORS,
E. V. Petersen.
Oilweek, Vol 24, No 42, p 32, 36, 38, 44, December, 1973. 3 fig, 2 tab.

Descriptors: *Drilling, *Drilling equipment, *Turbines, Drill holes, *Canada.
Identifiers: *Dyna-Drill, *Turbo-drills, *Downhole motors, Directional drilling.

The increased use of downhole motors for drilling operations in Canada is discussed. Recently, there has been a considerable increase in the use of turbo-drills and Dyna-Drills in both directional and straight hole drilling. The main advantages offered by downhole motors are faster penetration, considerably less trip time, and better hole control. The Dyna-Drill offers many advantages over most turbines. It has simplicity of design; it can operate at lower rpm's to utilize ordinary rock bits; it requires less cash outlay; and, it is more effective in directional drilling operations. However, the Dyna does not operate well with oil-base muds, and its all-steel bearings have a shorter life than the rubber-steel bearings of the turbines. The higher operating costs of turbo-drills is commonly offset by the two to four fold increase in penetration rate that is often realized. (Campbell-NWWA)
W74-10854

VERTICAL TURBINE PUMPS - PART 2: IMPELLER AND CHARACTERISTIC CURVES,
Orange County Flood Control District, Santa Ana, Calif.
J. W. Williams.
Water and Sewage Works, Vol 116, No 4, p 127-129, April, 1969. 1 fig.

Descriptors: *Turbines, Pumps, Impellers.
Identifiers: *Turbine pumps, *Vertical turbines.

The effect of impeller configuration on the overall operation and efficiency of turbine pumps is discussed. Impeller configurations close to a radial position contrast with axial impellers in that they develop more head, have a flatter head capacity curve, and have a rising horsepower curve. Pumps with radial impeller configurations are more suited to deal with varying system demands without significant loss of pressure. Pumps with axial impeller configurations are more suited to deal with systems where the capacity remains unchanged. The vertical turbine is considered to have an optimized impeller design when compared with that of axial and radial designs. The vertical turbine has the advantage over other impeller designs in that the head requirement is no longer a consideration, and the horsepower curve is quite flat. Impellers may also be classified as either a semi-open or enclosed type. As compared to semi-open impellers, the enclosed impellers are relatively insensitive to vertical impeller positioning, and develop much less unbalanced thrust. For these reasons, the enclosed impeller is more satisfactory in deep settings where lineshaft stretch is a problem. (See also W74-10856 and W74-10857) (Martino-NWWA)
W74-10855

VERTICAL TURBINE PUMPS - PART 3: THRUST,
Orange County Flood Control District, Santa Ana, Calif.
J. W. Williams.
Water and Sewage Works, Vol 116, No 5, p 177-179, May, 1969. 1 tab.

Descriptors: *Turbines, Pumps, Impellers.
Identifiers: *Turbine pumps, *Vertical turbines, Lineshaft stretch, Impeller design.

The development of down-thrust in turbine pumps is discussed and down-thrust is related quantitatively to impeller design and classification. Down-thrust, which is the difference in pressure and surface area between the top and bottom of the impeller, is less for an enclosed impeller than for a semi-open impeller. Upthrust, which is caused by the change in direction of flow as the fluid moves through the impeller, is greatest for a radial-flow impeller, and smallest for an axial-flow impeller. If the amount of down-thrust achieves some critical value, a certain amount of lineshaft stretch occurs forcing the impellers against the bottom of the bowls causing vibration and impeller wear. Enclosed impellers are not greatly affected by vertical movement whereas semi-open impellers are quite sensitive to lineshaft stretch. Speed is an important consideration in pump selection. High speed results in the need for fewer pump stages, the size of the motor is reduced, and the torque can be better transmitted, all resulting in lower initial cost. Higher speed pumps are sometimes a disadvantage because they require a high Net Positive Suction Head. Vertical turbines, in contrast to horizontal turbines, have an advantage in that they can operate at high speeds with a small Net Positive Suction Head. (See also W74-10855) (Staplin-NWWA)
W74-10856

VERTICAL TURBINE PUMPS - PART 4: WELL CHARACTERISTICS,
Orange County Flood Control District, Santa Ana, Calif.
J. W. Williams.
Water and Sewage Works, Vol 116, No 6, p 226-227, June, 1969. 11 ref.

Descriptors: *Turbines, *Pumps, Performance.
Identifiers: Well characteristics, *Vertical turbines, Horizontal split-case pumps.

How well characteristics influence pump performance is described and the overall characteristics of vertical turbines and horizontal split-case pumps are compared. To optimize pump performance, it is suggested that the amount of lineshaft deflection be minimized; the velocities of water entering the well be limited to prevent sand production; the pump not be placed below the perforations; and, the amount of drawdown in unconsolidated formations be limited. The vertical turbine pumps offer the following advantages over typical horizontal split-case pumps: a smaller motor can be used with a vertical turbine; less floor space is needed; piping arrangement is simplified; no suction pipe is needed; stages may be added or subtracted; and, freeze protection is minimized. The vertical turbine has the following disadvantages: pump bearings are more susceptible to corrosion; inaccessible for maintenance; major pump stripping is necessary to expose the bowls, and, the vertical turbines cannot operate at a high efficiency over a wide range of speed. (See also W74-10855) (Campbell-NWWA)
W74-10857

HOW GEOTHERMAL WELLS ARE DRILLED AND COMPLETED,
Big Chief Drilling Co., Oklahoma City, Okla.
For primary bibliographic entry see Field 8A.
W74-10860

8D. Soil Mechanics

CLASSIFICATION, ENGINEERING PROPERTIES AND FIELD EXPLORATION OF SOILS, INTACT ROCK AND IN SITU ROCK MASSES,
Newmark (Nathan M.) Consulting Engineering Services, Urbana, Ill.
For primary bibliographic entry see Field 8E.
W74-10356

REGIONAL LANDFILL AND CONSTRUCTION MATERIAL NEEDS IN TERMS OF DREDGED MATERIAL CHARACTERISTICS AND AVAILABILITY: VOLUME I: MAIN TEXT; VOLUME II: APPENDIXES,
Green Associates, Inc., Towson, Md.
For primary bibliographic entry see Field 5G.
W74-10624

THE EFFECTS OF WATER CONTENT AND DENSITY ON THE ELECTRICAL RESISTIVITY OF SOIL,
Brooklyn Coll., N.Y. Dept. of Geology.
For primary bibliographic entry see Field 2G.
W74-10829

8E. Rock Mechanics and Geology

CLASSIFICATION, ENGINEERING PROPERTIES AND FIELD EXPLORATION OF SOILS, INTACT ROCK AND IN SITU ROCK MASSES,
Newmark (Nathan M.) Consulting Engineering Services, Urbana, Ill.
W. J. Hall, N. M. Newmark, and A. J. Hedron, Jr.
Available from Sup Doc, GPO, Washington, D.C. 20402, Price $2.70. Atomic Energy Commission Directorate of Regulatory Standards Contract Report WASH-1301, May 1974. 256 p, 59 fig, 7 tab, 76 ref, append. USAEC Contract AT(49-5)-2667.

Descriptors: *Engineering geology, *Nuclear powerplants, Civil engineering, Safety, Public

health, Design, Foundation investigations, Soil investigations, Geology, Geologic investigations, On-site investigations, *Rock mechanics, *Soil mechanics.

Engineering properties of soil and rock materials are classified and described as they pertain specifically to nuclear reactor facility investigations. The procedures commonly employed in determining the classification and engineering properties of soils are given. Interpretation of the results of triaxial tests, determination of stress and strain properties, classification and engineering properties of intact rock and in situ masses, and exploration and evaluation procedures for both soils and rock are discussed. (Knapp-USGS)
W74-10356

AN EXPERIMENTAL MEASUREMENT OF IN SITU STRESS IN GRANITE BY HYDRAULIC FRACTURING,
Los Alamos Scientific Lab., N. Mex.
R. L. Aamodt.
Available from NTIS, Springfield, Va 22161 as LA-5605-MS Price $4.00 printed copy; $2.25 microfiche. Informal Report LA-5605-MS, California University, April 1974. 4 p, 2 fig, 8 ref. AEC Contract W-7405-Eng. 36.

Descriptors: *Rock mechanics, *Fractures(Geologic), *Fracture permeability, Cracks, Granites, Pressure, Hydrostatic pressure, Mechanical properties.
Identifiers: *Hydraulic fracturing.

Hydraulic-fracturing experiments were carried out in a 785-m wellbore drilled 145 m into granite. The energy required to create and then to reopen one fracture was determined by integrating the pressure-volume curves. A value of 100 Joules per sq m was obtained for the apparent surface energy of the granite. Two values of 14.7 MPa and one of 13.7 MPa were obtained for the least principal earth stress by independent methods. In a later experiment, a large volume (4000 liter) fracture was formed under pressure sufficient to raise the overburden. The pressure history of this fracture after shut-in indicates that an almost horizontal fracture was opened, as well as a vertical one. (Knapp-USGS)
W74-10663

TUNNELS--MACHINE EXCAVATION RATE OF PROGRESS--MACHINE DATA,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
Available from NTIS, Springfield, Va 22161 as REC-ERC-74-7 Price $3.00 printed copy; $2.25 microfiche. Report 74-7, May 1974. 12 p.

Descriptors: *Tunneling machines, *Tunneling, *Tunnels, *Excavation, *Tunnel construction, Equipment, Construction equipment, Rock mechanics.

Information on 12 machine-bored water tunnels constructed by the Bureau of Reclamation is presented graphically and pictorially. Machine data, rates of progress, tunnel profiles, and rock types and strengths are given for each tunnel. The bored diameters of these tunnels vary from 9 to 21 feet. Rocks encountered in boring were shale, sandstone, conglomerate, quartzite, limestone, siltstone, granite porphyry, granite gneiss, gneissic granodiorite, rhyolite, rhyodacite, and agglomerate. The compressive strengths of these rocks were 300 to 38,000 psi. The boring rates of the machines used varied from 17 to 107 feet for the average calendar day. The maximum progress was 403 feet 1 three-shift day. This rate was attained in 17.3 hours of machine time while boring an 8-foot 7-inch finished-diameter tunnel through shale having a maximum compressive strength of 6,000 psi. (Knapp-USGS)
W74-10680

UNDERGROUND STORAGE OF NATURAL GAS IN ILLINOIS-1973,
Geological Survey, Urbana, Ill.
T. C. Buschbach, and D. C. Bond.
Illinois Petroleum 101, 1974. 74 p, 43 fig, 33 tab, 50 ref.

Descriptors: *Underground storage, Storage capacity, Reservoir storage, Natural gas, *Illinois.
Identifiers: *Natural gas storage.

Natural gas is stored in underground reservoirs at 37 locations in Illinois. These reservoirs contain more than 580 billion cubic feet of gas, about one-third of which is working gas and two-thirds is cushion gas. Potential usable capacity of these reservoirs is estimated to be 1.2 trillion cubic feet. At 11 of the storage projects, gas is stored in depleted, or partially depleted gas reservoirs; one depleted oil reservoir is used for storage; in the remaining projects, gas is stored in aquifers that originally contained no hydrocarbons in commercial quantities. At four locations, two reservoirs at different depths are in various stages of exploration, testing, or development for storage. Two projects have been abandoned. Rocks of all systems from Cambrian to Pennsylvanian are used for storage of gas in Illinois. Most of the storage volume, however, is in sandstone aquifers of Cambrian and Ordovician age. A brief discussion is included of some of the technology associated with the underground storage of natural gas. Also included is information on the geologic setting and the history of development of each project. (Campbell-NWWA)
W74-10834

THE USE OF ENTIRE APPARENT RESISTIVITY CURVES FOR INTERPRETATION OF NORMAL RESISTIVITY LOGS,
Colorado School of Mines, Golden. Dept. of Geophysical Engineering.
T. D. Ozcandarli.
M Sc Thesis, May 1969. 104 p, 19 fig, 11 ref, 2 append.

Descriptors: *Resistivity, Bedrock, Beds, Sedimentary rocks, Lithology, *Aquifer characteristics, *Groundwater, *Borehole geophysics.
Identifiers: Apparent resistivity difference, *Bed thickness, Empirical relations, Transformation.

An empirical method is developed for construction of the apparent resistivities, derivatives of apparent resistivities, for beds of finite thickness, and of finite resistivity in the presence of a borehole from the same quantities corresponding to a bed of same thickness but of infinite resistivity. When the derivatives of apparent resistivities corresponding to beds of finite resistivities are cross-plotted against that of an infinitely resistive bed, a linear relation is obtained. The slope of the line is the same for a given resistivity no matter what the thickness of the bed is. A new quantity called 'apparent resistivity difference,' is introduced. Cross-plots are developed for interpretation of 'normal' resistivity logs. Certain distinctive points on these plots indicate the position of the bed boundaries and can be used to estimate the bed thickness with an error of less than one inch. Since an empirical relation for transformation of the derivatives and of apparent resistivity differences from one bed thickness to another is available, it is possible to compare the resistivities of the same bed in two wells even if their thicknesses are different. (Campbell-NWWA)
W74-10835

ELECTRIC AND CALIPER LOGS AS LITHOLOGIC INDICATORS IN VOLCANIC ROCKS, NEVADA TEST SITE,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 8G.
W74-10836

APPLICATIONS OF INHOLE GEOPHYSICAL LOGS IN VOLCANIC ROCKS, NEVADA TEST SITE,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 8G.
W74-10846

ROCK CUTTING BY IMPACT ACTION,
Nottingham Univ. (England). Dept. of Mining Engineering.
For primary bibliographic entry see Field 8C.
W74-10847

A THEORY OF HYDRAULIC ROCK CUTTING,
Flow Research, Inc., Kent, Wash.
For primary bibliographic entry see Field 8C.
W74-10848

8F. Concrete

COMPRESSIVE STRENGTH OF 67-YEAR OLD CONCRETE SUBMERGED IN SEAWATER,
Naval Civil Engineering Lab., Port Hueneme, Calif.
H. H. Haynes, and P. C. Zubiate, Jr.
Available from NTIS, Springfield, Va 22161 as AD-772 527 Price $3.00 printed copy; $2.25 microfiche. Technical Note N-1308, October 1973. 8 p, 4 fig, 2 tab, 5 ref.

Descriptors: *Compressive strength, *Concrete testing, *Sea water, Weathering, Breakwaters, *California, Concretes.
Identifiers: Los Angeles Harbor(Calif).

Concrete blocks submerged partly or totally in seawater for 67 years off the Los Angeles Harbor breakwater were cored to test compressive strength. The compressive strengths of the blocks were compared with strengths measured 40 years earlier. Two blocks increased in strength, three remained the same and one decreased. The blocks still showed fairly sharp edges and original form marks. Rock-boring mollusks were found on the surface of the blocks but they did not damage the concrete. (Knapp-USGS)
W74-10402

SHOTCRETE AT MEXICO CITY,
R. E. Mason.
Tunnels and Tunnelling, Vol 6, No 2, p 59, 61-62, March, 1974. 5 fig, 2 ref.

Descriptors: *Tunnel construction, *Tunne l design, *Tunnelling, *Gunite, Engineering structures, Drainage systems, *Mexico.
Identifiers: *Shotcrete.

The Mexico City drainage system includes 102 km of tunnels, in which there are two interceptors and an outfall. Most excavation was done by conventional methods with a horseshoe tunnel section. The geology is characterized by bentonites, lacustrine sandy and silty deposits, volcanics, and hard clays. The lacustrine deposits are very changeable (heavy water flows in sandy beds, fractures in the more blocky areas) and provided difficulty in tunnelling. The volcanics (rhyolotes, dacites, andesites, basalts) were blocky or highly fractured and were sometimes accompanied by mylonization. Major faults were accompanied by hydrothermal alteration. The hard clays were often weakened by shear or were in some areas blocky. Shotcrete was used in the tunnelling to increase the rate of operations. Fifty-one spraying machines and 48 mixer-transporter cars sprayed over 200,000 cubic meters of shotcrete dry-mix by mid 1973. In the volcanics, the Swedish method of shotcrete support was utilized -- covering the rock surface with a thin shotcrete coat and filling in corners and fractures; while in the lacustrine deposits systematic patterns of fully-grouted, untensioned anchors were used in addition to the shotcrete.

When montmorillonite clays were encountered shotcrete and full section steel sets were used to resist swelling pressures. The shotcrete dry-mix was composed of aggregates, cement and additives. Under difficult conditions a fast-setting coat was applied followed by normal structural shotcrete. Heavy water flows were dealt with by drainage tubes and drain holes. (Murphy-FIRL)
W74-10452

DAMAGED SEWAGE PIPE REMOVED BY DIAMOND SAWING,
For primary bibliographic entry see Field 8C.
W74-10458

PIPE JACKING -- A TECHNIQUE FOR SOFT GROUND TUNNELLING,
Cementation Co. Ltd., Calcutta (India).
For primary bibliographic entry see Field 8A.
W74-10821

ACCELERATED CURING OF CEMENTITIOUS SYSTEMS BY CARBON DIOXIDE, PART II. HYDRAULIC CALCIUM SILICATES AND ALUMINATES,
Illinois Univ., Urbana. Dept. of Civil and Ceramic Engineering.
R. L. Berger, and W. A. Klenn.
Cement and Concrete Research, Vol 2, No 6, p 647-652, November 1972. 2 tab, 8 ref.

Descriptors: Calcium compounds, Carbon dioxide, Chemical reactions, *Silicates, *Cements.
Identifiers: *Calcium silicates, *Calcium aluminates, Strength development, Strength gain, Water/solids ratio.

The treatment of Ca3SiO5, Beta-Ca2SiO4, Ca3Al206, and Ca12Al14033 low water/solids ratio compacted pastes with carbon dioxide immediately after preparation resulted in a rapid strength development of the calcium silicates and a negligible strength development of the calcium aluminates. The strength gain after 5 min. of carbon dioxide treatment was over 3,000 psi for both the Ca3SiO5 and Beta-Ca2SiO4 pastes. There was no apparent difference between the rate of reaction of the Ca3SiO4 pastes as based on strength gain characteristics. (Staplin-NWWA)
W74-10849

THE PARTITION OF CALCIUM AMONG CEMENTING COMPOUNDS IN AGING HIGHWAY CONCRETES,
Iowa State Univ., Ames.
D. E. Simon.
M Sc thesis 1968. 82 p, 12 fig, 2 tab, 41 ref, 2 append.

Descriptors: *Cements, *Concretes, Portland cements, *Aging(Physical), Durability, Deterioration, *Grouting, Petrology, *Calcium, *Iowa, Highways.
Identifiers: Chemical processes, Physical processes, Fine aggregate fractions, Coarse aggregate fractions, Hydrated cement fractions, *Cementing.

The purpose was to verify by means of a chemical study petrographic evidence that changes occur in aging concretes. The chemical investigation of the hydrated cement portion of the matrix was designed to obtain data which would be of maximum use. This approach necessitated development of several techniques, such as a chemical partition of silica and insoluble residue contents, a calcium balance of the major phases present in the hydrated cement and a method of recalculating the chemical data to an additive basis. Prior investigations generally have considered all Type I cements to be a material with approximately uniform phase composition, and did not distinguish between different brands or sources of cement. However, techniques used in this investigation emphasize that the chemical data are dependent on the source of cement and therefore the cement source is critical in any interpretation of concrete performance. Results of this study substantiate by chemical methods petrographic evidence observed by other investigators that the hydrated cement portion of concrete changes with age. In addition, this study provides a general path by which chemical reactions related to aging follow to account for the observed changes, as well as a chemical background for understanding these changes in concrete deterioration. (Campbell-NWWA)
W74-10853

THE CHANGE IN REACTIVITY OF SILICATE ANIONS DURING THE HYDRATION OF CALCIUM SILICATES AND CEMENT,
Central Research and Design Inst. for Silicate Industry, Budapest (Hungary).
F. D. Tamas, and M. Fabry.
Cement and Concrete Research, Vol 3, No 6, p 767-776, 1973. 2 fig, 2 tab, 20 ref.

Descriptors: *Silicates, *Hydration, Chemical reactions, *Cements, *Anions.
Identifiers: Tricalcium silicate, Beta-tricalcium silicate, Portland cement.

The change in reactivity of the silicate anion complex of tricalcium silicate, beta-dicalcium silicate and portland cement during hydration was studied by measuring the rate constant (k) of the silicomolybdic acid formation. The three anhydrous starting materials have identical k values indicating their identical monosilicate anion structure. During hydration the value of k decreases continuously; the rate of decrease of k is highest in case of cement and lowest in case of beta-dicalcium silicate. The decrease of k can be attributed to the formation of bridging oxygen ions in the silicate complex. k tends to reach a final, limiting value; beyond this k can still be decreased by special techniques as, e.g., by regrinding and rehydrating the hardened samples. (Campbell-NWWA)
W74-10859

8G. Materials

SNOW ROAD CONSTRUCTION TECHNIQUE BY LAYERED COMPACTION OF SNOW-BLOWER PROCESSED SNOW,
Naval Civil Engineering Lab., Port Hueneme, Calif.
M. W. Thomas, and K. D. Vaudrey.
Available from NTIS, Springfield, Va 22161 as AD-767 637, Price $2.75 printed copy; $2.25 microfiche. Technical Note N-1305, August 1973. 13 p, 7 fig.

Descriptors: *Snow, *Road construction, *Antarctic, *Construction materials, Road design, Cold weather construction, Compaction, Cold regions, Polar regions.

Techniques developed by the Naval Civil Engineering Laboratory (NCEL) for constructing snow roads were studied to find simpler methods. Elevated high-strength snow roads are constructed over the deep snowfields in Antarctica between McMurdo Station and the Williams Field complex to move cargo and personnel in rubber-tired vehicles. To achieve this objective, new cutterheads were installed on a ski-mounted snowblower and the pulverized snow was deposited and spread in 4-inch layers which were compacted by tractors. This new method eliminates special ski-mounted snow mixers, a savings of both costly equipment and construction time. Test results show that the experimental snow road densities and shear strengths compare favorably with those of previous roads built by pulvimixing. The experimental test section held up under two months of wheeled traffic, proving that snow roads built by the new construction technique will give satisfactory service. (Knapp-USGS)
W74-10403

THE INFLUENCE OF THE CHEMICAL NATURE OF POLYMERS ON THEIR DRAG REDUCTION CHARACTERISTICS,
Hydronautics, Inc., Laurel, Md.
For primary bibliographic entry see Field 8B.
W74-10427

PIPE INSPECTION CAMERAS AND TECHNIQUES,
Photo Data Inst., Janesville, Wis.
D. W. Hyzer.
Pollution Engineering, Vol 6, No 6, p 37-40, June, 1974. 4 fig, 4 tab.

Descriptors: Sewage treatment, *Water pollution control, Environmental sanitation, Sanitary engineering, Excavation, *Photography, *Cameras, Infiltration rates.
Identifiers: *Closed-circuit television, Photographic cameras, *Pipe inspection.

Growing public concern over environmental pollution has placed new demands on internal sewer-line inspection procedures. Smoke testing, rodding, and lamping were considered sufficient only a few years ago but have been outmoded by the more effective optical techniques available today. Film and video methods make it possible for the engineer to pinpoint problem areas and eliminate guesswork concerning the condition of new and old installations. Infiltration rates can be estimated, so that proper control measures can be undertaken. Accurate location data help minimize excavation costs when corrective repairs are required. Various inspection systems are described. Optical pipe-inspection equipment can be classed into two basic systems: (1) closed-circuit television and (2) photographic cameras. In the past, video methods have been more widely used than photography in pipe-inspection applications, but escalating costs and new documentation requirements are expected to increase the use of photography in the future. (Martino-NWWA)
W74-10828

RESISTIVITY METHODS IN PROSPECTING FOR GROUND WATER,
Kansas State Univ., Manhattan. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-10832

ELECTRIC AND CALIPER LOGS AS LITHOLOGIC INDICATORS IN VOLCANIC ROCKS, NEVADA TEST SITE,
Geological Survey, Denver, Colo.
R. P. Snyder.
The Geological Society of America, Memoir 110, p 117-124, 1968. 7 fig, 1 ref.

Descriptors: *Borehole geophysics, Electrical studies, *Well logging, *Electrical well logging, Igneous rocks, Lithologic logs, Nevada.
Identifiers: *Nevada test site, *Lithologic indicators, Caliper logs, Electric logs.

Electric logs are being used on Pahute Mesa at the Nevada Test Site for preliminary identification of volcanic rock units penetrated by drill holes. Induced and produced water in the drill holes have essentially the same resistivity, so the spontaneous potential curve is negated. In general, resistivities are lowest in the bedded tuffs and increase proportional to welding in ash-flow tuffs, and are greatest in rhyolitic lava flows. Caliper logs can be used to locate lithologic zones which will tend to slough or cave. These zones are the poorly indurated ash-fall tuffs, vitric and highly fractured ash-flow tuffs and rhyolites. Zeolitized ash-flow and ash-fall tuffs and unfractured rhyolites are competent. (Staplin-NWWA)
W74-10836

WELL AND PUMP CORROSION,
Layne and Bowler, Inc., Memphis, Tenn. Layne Research Div.

K. E. Moehrl.
Water and Wastes Engineering, Vol 3, No 2, p 54-56, February 1967.

Descriptors: *Corrosion, *Corrosion control, Cavitation, Chemical reactions, Economics, Bacteria, *Pumps.
Identifiers: *Pump corrosion, *Corrosion prevention.

Factors that determine the extent and rate of pump corrosion are discussed. These factors include installation type, construction materials, water characteristics, operation methods, and well location. Specific causes of corrosion such as acid waters, bacterial growth, galvanic corrosion, cavitation erosion, impingement erosion, and crevice corrosion are discussed in detail. The control and prevention of pump corrosion is presented as a unique problem at each well site. Thus, the specific preventive and curative procedures to be used will depend upon the cost of installation, equipment, operation, and maintenance. The most effective program of corrosion prevention should include an early analysis of the potential aquifer, good well and pump design, proper selection of materials and sound maintenance. (Martino-NWWA)
W74-10837

RADIOACTIVE ISOTOPES FOR WATER-INPUT PROFILES,
J. M. Edwards, and L. E. Holter.
The Oil and Gas Journal, Vol 53, No 30, p 69-70, November 29, 1954. 3 fig.

Descriptors: *Injection, *Radioactive isotopes, Tracers, Borehole geophysics, Telemetry.
Identifiers: *Isotope injection, Water-input profiles.

A method for determining the subsurface intervals that are being invaded by injection water is described. This method makes use of the radioactive isotope injection technique in combination with conventional gamma-ray logging. In this method, a radioactive slug is injected into the formation above a scintillometer and the time interval for the slug to travel from the injection point to the counter is recorded. The velocity of the injection fluid through the bore hole can be calculated from the injection data. Besides measuring velocity, the method also records any decrease in radioactive intensity at the scintillometer that might reflect loss of fluid into the formation. A method is described whereby the relative amounts of fluid entering each sand may be calculated using data from radioactive injection. (Staplin-NWWA)
W74-10838

CORROSION CONTROL EXTENDS LIFE OF INCREASINGLY EXPENSIVE WATER WELLS,
Layne Associates, Memphis, Tenn.
F. Dorr, Jr., and A. L. Williams, Jr.
Water and Sewage Works, Vol 116, No 11, p 377-380, November 1969. 6 fig.

Descriptors: *Corrosion, *Corrosion control.
Identifiers: Cathodic protection.

Corrosion has been found to be the single most significant factor influencing a well's failure. Corrosion is related to the flow of direct current electricity from the metal into the natural environment. The corrosion occurs at the point where the current flows away from the metal, carrying particles of the metal into the soil or water. An effective means of preventing this kind of corrosion is to prevent the current from leaving the metal. Corrosion control is afforded water wells at one or all three of the following points: (1) electrolysis corrosion, which is combated through electrical isolation; (2) column piping and internal casing corrosion, which is combated with cathodic protection using sacrificial galvanic anodes; and, (3) external surface area corrosion of casing and filter screen which is combated with cathodic protection. The steps required in the performance of a professionally engineered corrosion control program consist of: (1) preliminary engineering survey; (2) engineering design and cost proposal; (3) acceptance and installation; and, (4) check-out and certified engineers report. (Staplin-NWWA)
W74-10839

PRACTICAL FUNDAMENTALS FOR FIELD USE OF INSTRUMENTS AND EQUIPMENT,
J. R. Cowles.
Materials Protection and Performance, Vol 12, No 1, p 25-31, January 1972. 3 fig.

Descriptors: *Corrosion control, *Potentiometers, Equipment, Resistance, Resistivity, *Cathodic protection.
Identifiers: Field instruments, *Cathodic protection instruments.

Basic characteristics are outlined of cathodic protection instruments, primarily as applied to underground structures. Emphasis is placed on the reasons that certain varieties of meters are used, and the limitations that are imposed by the resolution of the meters. Most instruments used in cathodic protection must be operated by very small amounts of power so that their design must be pushed to practical limits. These instruments must also have a high sensitivity because many of the processes being monitored involve minute wattages. The sensitivity of any DC meter is a function of the area which the moving coil encompasses, and the pivot and jewel friction. The equipment used by most corrosion engineers should consist of a galvanometer, ammeter, AC resistivity meter, taut bond meter, and a voltmeter. The voltmeter chosen should have a high ohm per volt rating to ensure high sensitivity. The adverse conditions often encountered by corrosion engineers makes the potentiometer voltmeter more appropriate. The care of most instruments should be directed at minimizing the amount of handling, travel, and jarring that the meter is subjected to. (Staplin-NWWA)
W74-10843

CORROSION CONTROL ON BOREHOLE WATER PUMPS,
Water Planning for Israel Ltd., Tel-Aviv.
M. Unz.
Materials Protection and Performance, Vol 13, No 12, p 40-45, December 1973. 5 fig, 2 tab, 4 ref.

Descriptors: *Corrosion control, Cathodic protection, Saline water, Coatings, *Pumps, Chemical reactions, Casings, Columns.
Identifiers: *Borehole water pumps, *Israel.

Equipment service life, and protection methods used in Israel to combat corrosion on borehole water pumps are discussed. An effective corrosion control program is considered to consist of the following parts: water evaluation; proper pump protection; proper column protection; proper casing configuration; and, a corrosivity grading procedure. Water evaluation should determine any potential chemical corrosive agent such as chloride, hydrogen sulfide, or free carbon dioxide. In addition to the chemical composition of the water, the prevailing physical conditions such as temperature, amount of solute, and hydraulic conditions should be considered. Pump protection consists of proper hydraulic design, a system of corrosion resistant materials, and proper coatings. The outer sides of the columns that are commonly submerged in groundwater are often subjected to corrosive currents produced by an oxygen cell at the water line. To prevent galvanic corrosion of this type, the column should be either partially or completely coated, depending on the depth of the pump. If sufficient clearance is not maintained between pump and casing, and the two come into contact, a galvanic circuit will close and corrosion may begin. Corrosivity grading should be based on the particular chemical agents of the region. (Martino-NWWA)
W74-10844

APPLICATIONS OF INHOLE GEOPHYSICAL LOGS IN VOLCANIC ROCKS, NEVADA TEST SITE,
Geological Survey, Denver, Colo.
R. D. Carroll.
The Geological Society of America, Memoir 110, p 125-134, 1968. 6 fig, 5 ref.

Descriptors: *Borehole geophysics, *Well logging, Electrical well logging, Igneous rocks, Acoustics, *Nevada.
Identifiers: *Acoustic logging, *Inhole geophysical logs, Volcanic rocks, Electric logs.

Electric logs are the major qualitative tool in determining lithologic contacts in volcanic rocks at the Nevada Test Site. In one drill hole, only the electric log, of several geophysical logs, indicates the presence of the contact between an ash-flow tuff and a rhyolite. Acoustic logging devices, however, are most useful in the quantitative determination of rock properties. A relationship exists between sonic velocity and rock porosity in these volcanic rocks. Acoustic logs using full-wave recording techniques indicate that shear and Young's modulus values are related to rock velocity. Consequently, it may be possible to determine many of the engineering physical properties of certain rock types by using only a sonic log. (Csmpbell-NWWA)
W74-10846

THE CHANGE IN REACTIVITY OF SILICATE ANIONS DURING THE HYDRATION OF CALCIUM SILICATES AND CEMENT,
Central Research and Design Inst. for Silicate Industry, Budapest (Hungary).
For primary bibliographic entry see Field 8F.
W74-10859

CORROSION RESISTANT, NONMETALLIC WATER WELL SYSTEMS,
Radian Corp., Austin, Tex.
P. E. Hudson, and F. W. Nobles.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-760 588, $6.00 in paper copy, $2.25 microfiche. Publication No AFWL-TR-72-146, 1973. 166 p, 71 fig, 19 tab, 12 ref, 1 append.

Descriptors: *Casings, *Well casings, Wells, *Pipes, *Plastic pipes, Physical properties, Corrosion control, Testing, *Strength of materials, Laboratory tests.
Identifiers: Tension tests, Biaxial compression, Point load, Uniform load, *Fiberglass reinforced pipe.

The use of fiberglass reinforced plastic pipe for water well applications was investigated. To carry out this investigation, a test program and test procedures were developed due to the unavailability of uniform test methods for plastic pipe for this application. The apparatus necessary for the test method program, including long and short term tension tests as well as biaxial, point and uniform load compression tests and combinations of these tests, was constructed and the tests performed on commercially available plastic pipe from several manufacturers. The results of these tests allow comparisons of the physical properties of the nine manufacturers' pipe tested. These data are compiled in such a manner that they can be utilized to design an optimum well system for any particular installation. (Staplin-NWWA)
W74-10863

REQUIREMENTS FOR THE MONITORING OF INDUSTRIAL DEEP-WELL WASTE-DISPOSAL SYSTEMS,
Dow Chemical Co., Houston, Tex.

For primary bibliographic entry see Field 5B.
W74-10867

8H. Rapid Excavation

TUNNELS--MACHINE EXCAVATION RATE OF PROGRESS--MACHINE DATA,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 8E.
W74-10680

CAN DREDGING BE CONTINUED TO MAINTAIN GREAT LAKES,
Corps of Engineers, Chicago, Ill. North Central Div.
For primary bibliographic entry see Field 6D.
W74-10899

8I. Fisheries Engineering

PREPARATION AND PROPERTIES OF QUINALDINE SULFATE, AN IMPROVED FISH ANESTHETIC,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
J. L. Allen, and J. B. Sills.
Bureau of Sport Fisheries and Wildlife, Investigations in Fish Control, No 47, April 1973. 5 p, 2 fig, 1 tab, 12 ref.

Descriptors: *Fish management, *Fish control agents, *Fisheries, *Fish physiology, Fish toxins, Chemical reactions, Fish handling facilities, Fish stocking, Methodology, Sulfates.
Identifiers: *Fish anesthesia, *Quinaldine sulfate, Fish handling.

The preparation of quinaldine salt and its chemical characterization are described for use as an anesthetic by fishery workers. The preparation of quinaldine sulfate (QdS04) from practical grade quinaldine and sulfuric acid yields a crystalline product which is water soluble and easily purified by recrystallization. The product conforms with the empirical formula C10H11NS04 and assays 99.4% pure by titration. The crystalline material has little odor and is water soluble; thus, it is less objectionable and much easier to handle than quinaldine for anesthetizing fish. The quinaldine sulfate was prepared from Eastman Kodak, 95% quinaldine. Two small batches of quinaldine sulfate were prepared by reacting 20 ml of quinaldine with 7.0 ml of concentrated sulfuric acid in the presence of a hydrocarbon solvent. (Woodard-USGS)
W74-10386

TOXICITY OF QUINALDINE SULFATE TO FISH,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
For primary bibliographic entry see Field 5C.
W74-10387

THE EFFICACY OF QUINALDINE SULFATE AS AN ANESTHETIC FOR FRESHWATER FISH,
Bureau of Sport Fisheries and Wildlife, Washington, D.C.
P. A. Gilderhus, B. L. Berger, J. B. Sills, and P. D. Harman.
Bureau of Sport Fisheries and Wildlife, Investigations in Fish Control, No 49, April 1973. 7 p, 6 tab, 7 ref.

Descriptors: *Fish management, *Fish control agents, *Fish physiology, *Toxicity, Chemical reactions, Water properties, Freshwater fish, Analytical techniques, Water temperature, Hydrogen ion concentration.
Identifiers: *Fish anesthesia, *Quinaldine sulfate, Fish handling.

Quinaldine sulfate (QdS04), an improved formulation of the fish anesthetic quinaldine, was tested for its efficacy on 15 species of freshwater fish. The new crystalline formulation is water soluble and easier to use than practical grade quinaldine. QdS04 anesthetizes most salmonids at 25 mg/liter in less than 4 minutes and the fish recover in 1 to 13 minutes in fresh water. The effective concentrations for several warmwater species varied from 15 mg/liter for bluegills to 60 mg/liter for channel catfish. Fish were held for up to 60 minutes in effective concentrations without suffering mortalities. The efficacy of the anesthetic was little affected by water temperature, but the compound lowers the pH of some soft waters to below 6, the point at which it becomes ineffective as an anesthetic. All fish retained some reflex action and thus, some large fish were difficult to handle. (Woodard-USGS)
W74-10388

RESIDUE OF QUINALDINE IN TEN SPECIES OF FISH FOLLOWING ANESTHESIA WITH QUINALDINE SULFATE,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
For primary bibliographic entry see Field 5C.
W74-10389

PHASE II: TEMPERATURE REQUIREMENTS OF SALMONIDS IN RELATION TO THEIR FEEDING, BIOENERGETICS, GROWTH AND BEHAVIOR,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W74-10394

WATER INTAKE SCREEN,
FMC Corp., San Jose, Calif. (assignee)
R. G. Hughes, and W. M. Evard.
US Patent No 3,802,565, 5 p, 9 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 921, No 2, p 592, April 9, 1974.

Descriptors: *Patents, *Fish barriers, Equipment, Flotsam, *Screens.
Identifiers: *Water screens, *Traveling water screens, Fisheries engineering.

A traveling intake water screen installation for removing debris and fish from a flowing stream of water includes a screen movable through a vertically closed loop. The screen is suspended from a pair of dual material head sprockets and comprises multiple screen trays interconnected by endless dual material side chains. Each screen tray has flexible end closure plates for preventing passage of debris around the sides of the screen. (Sinha-OEIS)
W74-10446

EFFECTS OF ACUTE COLD SHOCK ON THE CHANNEL CATFISH, ICTALURUS PUNCTATUS,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W74-10785

BACTERIOLOGICAL SURVEYS, CHARLOTTE COUNTY, NEW BRUNSWICK, SHELLFISH AREA N.B. 13, 1973,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
For primary bibliographic entry see Field 5C.
W74-10786

BACTERIOLOGICAL SURVEYS, CHARLOTTE COUNTY, NEW BRUNSWICK, SHELLFISH AREA N.B. 14, 1973,
Environmental Protection Service, Ottawa (Ontario). Water pollution Control Directorate.
For primary bibliographic entry see Field 5C.
W74-10787

BACTERIOLOGICAL SURVEYS, CHARLOTTE COUNTY, NEW BRUNSWICK, SHELLFISH AREAS N.B. 9, 10, 11, AND 12, 1973,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
For primary bibliographic entry see Field 5C.
W74-10788

ADDITIONS TO THE WEST VIRGINIA ICHTHYOFAUNA, WITH COMMENTS ON THE DISTRIBUTION OF OTHER SPECIES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 2H.
W74-10800

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

DEVELOPMENT OF A PROTOTYPE SEARCH AND RETRIEVAL NETWORK FOR WATER RESOURCE INFORMATION AND USER EVALUATION SURVEY,
Oklahoma Univ., Norman. Office of Research Administration.
J. L. Morrison, L. G. Greenwell, R. Evans, and J. Freiden.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 335, $3.25 in paper copy, $2.25 in microfiche. Completion Report, April 15, 1974, 37 p. (WRSIC Retrieval System Report No 2). OWRR W-174(1).

Descriptors: *Information retrieval, *Networks, Data storage and retrieval, *Evaluation, *Information exchange.
Identifiers: Data retrival system, *Information user studies, *Information network evaluation.

Users generally were favorable to the WRSIC system; they also rated the system well in terms of 'ease of use' and 'applicability'. User attitude toward the overall data base was slightly lower. While respondents rated the data base high in terms of 'accuracy,' they rated it relatively low in 'completeness.' The majority of the respondents agreed that nothing should be eliminated from the data base. When formulating their last WRSIC search, half of the users spent less than two hours and only a few spent more than five hours. As an alternative scarch means, half of the users said they would have used a traditional library approach; many others suggested 'water resources abstracting services' as their alternative device. Users rated the network centers high on all attributes; especially 'helpfulness.' While half of the participants considered the turnaround time to be 'satisfactory,' nearly all respondents thought the turnaround time should be less than 14 days. About one-third of the samples first became aware of the WRSIC system by 'word of mouth/through association.' For the most part, respondents agreed that the system would be most beneficial to researchers and engineers. When asked what could be done to make the system better for the user, respondents regularly pointed out 'key word definitions' and 'more information about the data base/contents.' The most encouraging finding was that over 75% of the respondents expressed positive intentions to use the WRSIC system in the future. (See also W74-02821.)
W74-10412

10D. Specialized Information Center Services

SALINE GROUNDWATERS PRODUCED WITH OIL AND GAS,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 5A.
W74-10411

INFORMATION STORAGE AND RETRIEVAL SYSTEM FOR WELL HYDROGRAPH DATA USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 04B.
W74-10442

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ABSTRACT SOURCES

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A. Centers of Competence		
Colorado State University, Irrigation Return Flow Quality	W74-10739 -- 10761 10879 -- 10881 10883	27
Cornell University, Policy Models for Water Resources Systems	W74-10597, 10600 10602 -- 10603	4
Franklin Institute (FIRL), Municipal Wastewater Treatment Technology	W74-10447 -- 10499 10528 10551 -- 10576 10605 -- 10615 10813 -- 10825 10884 -- 10900	121
National Water Well Association, Water Well Construction Technology	W74-10826 -- 10829 10831 -- 10873	47
University of Florida, Eastern U. S. Water Law	W74-10500 -- 10516 10518 -- 10523 10549 10697 -- 10712 10714 -- 10729 10731 -- 10738 10874 -- 10878	69
University of Wisconsin, Eutrophication	W74-10762 -- 10763 10765 -- 10789 10791 -- 10795 10797 -- 10805 10807 -- 10810 10812	46
U. S. Geological Survey, Hydrology	W74-10353 -- 10390 10392 10398 -- 10405 10407 -- 10410 10424 10426 -- 10444 10616 -- 10689	145
B. State Water Resources Research Institutes		
California Water Resources Center	W74-10352, 10420	2
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Michigan Institute of Water Research	W74-10692	1
Minnesota Water Resources Research Center	W74-10417 -- 10418 10422, 10529	4
Mississippi Water Resources Research Institute	W74-10393, 10530 -- 10533	5
Oregon Water Resources Research Institute	W74-10394	1

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B. State Water Resources Research Institutes (Contd)		
Pennsylvania Institute for Research on Land and Water Resources	W74-10693 -- 10694	2
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Washington Water Research Center	W74-10419, 10524 10535, 10550	4
Wyoming Water Resources Research Institute	W74-10695	1
C. Other		
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Ocean Engineering Information Service (Patents)	W74-10445 -- 10446 10577 -- 10580 10583 -- 10596	20
Office of Water Research and Technology	W74-10351 10395 -- 10397 10412 -- 10416 10536 -- 10537 10696	12

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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

6 WATER RESOURCES PLANNING

7 RESOURCES DATA

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